Sri R.C. Sharma, Vice Chancellor, Gurukula Kangri Vishwavidyalaya welcoming Dr. Satyaketu Vidyalankar, Chancellor G.K V. at the Valedictory Session of the 'National Symposium On Fish & Their Environment' held from December 15–18, 1986.

—OM—

ARYA - BHATT

VIGYAN - PATRIKA

September-December, 1986

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SRI R. C. SHARMA
I. A. S. (Retd.)

Vice-Chancellor

With his arrival at the helm of affairs of the Vishwavidyalaya as Vice-Chancellor, the institution started humming with academic, research and extra-curricular activities

1— Publication of all periodicals has started. Steps for publication of a Science Research Journal are afoot.

2— In order to step up the rural development work, the Vice-Chancellor has constituted a 3-member committee with Prof. V Shanker as its Chairman and Dr. Anil Kumar & Dr. A. K. Chopra as members. Construction of check-dams to protect Kangri and other villages has started.

3— The project "Integrated Study of Ganga (Govt. of India DOE/CGA)" has been given extension by the Govt. to continue work on Ganga and the basin

4— Two national level conferences / seminars were held in the University under Botany and Zoology Deptts. respectively :

   i) National Seminar on Conservation and Ethnobotanical Aspects of Indigenous Medicinal Plants.

   ii) National Symposium on Fish and Their Environment.

5— A number of staff members participated in seminars / conferences in and outside the University.

6— A 3-month Certificate Course in "Proficiency in English" is being started under the Deptt. of English.

7— The deptt. of Ancient History, Culture & Archaeology has taken steps to hold a national-level conference on "Local Self Govt. in Ancient India".

8— The students of the University participated in Inter-University Tournaments (Cricket & Hockey).

9— The University is soon going to have a computer installed.

10— Under Himalayan Eco-Development Project 16,000 plants were planted and about 12,000 plants of timber and horticultural importance were distributed among the villagers.

'Arya Bhatta,' 1986
Vol. VI, No.—I, p. 3

Ganga And The Basin—Environmental Concerns

Indian rivers have always been held in sacred reverence and Ganga has been considered the most sacred among them. Originating in the Himalayas it merges in the Bay of Bengal. The total length of the Ganga from its source to its entry into sea is 2525 kilometers (1550 kms. in U.P., 455 in Bihar and 520 in West Bengal). The area of river basin, spreading in seven states, is 9 lac square kilometers. During its course it gets replenished at several points by various streams The Ganga is the life line and a major source of various socio-economic activities in a vast region. In the Indian mind the Ganga is intimately connected with spiritual values, traditions and beauty and greatness of nature.

The imaginative grip the Ganges has held on ancients and moderns alike is due to its holiness more than anything else In size it is not very long, a mere 2525 kms There are 28 rivers longer than this with Nile, Amazon, Mississippi-Missourie each running twice as far. Even on a local sub-continental reckoning Indus and Brahmputra come off better so far as size is concerned. Thus it is not really a great river in the physical sense. Its water levels are erractic and numerous stretches are unnavigable. However, it is the religious and spiritual artery of India. From the source to the sea along her banks one finds a towering scale of devout humanity. What Ganges mean, above all else, is best described in the words of a witness during the enquiry into the disaster at Allahabad in 1954. People said beforehand, "If we are killed we shall attain salvation. If we escape death, we shall go home. We shall be gainers in either case. Those who die at such a sacred spot, at such an auspicious moment would be very lucky. We wish to have the good fortune." For all his old Harrovian loftiness even Jawaharlal Nehru willed that some of his ashes must be sprinkled in Ganga. In her there is something to lift the spirit. True, she has been all things to all men ever since she came out of her ice cave in the Himalayas—

drinking fountain and irrigator, sewer, burial ground and source of food, washtub and bath But never for even a moment she has been anything less than a 'mother' an inspiration to millions ladling her sacred water over themselves; a promise of better things to come. Pilgrims believe that all sins are instantly washed away by a ritual bath in Ganges; and if only one could die here with cremation at her banks and ashes caste upon the water, it will be the most blessed gift of all, the absolute assurance of entry into heaven. The faith emanates from the story of Sagar's sons whose ashes were cleansed by the Ganges delta in the Bay of Bengal and the 60,000 souls attained paradise at last. Ganga was brought down from heaven for this purpose. Lord Shiva caught the falling Ganga in His matted hair releasing her gently to follow Bhagirath out of the Himalayas through its foot hills across the northern plains into the jungles of east until it met the ocean at the Bay of Bengal.

With its tributaries and sub-tributaries and catchment areas it covers one million square kilometers nearly one-third of India's geographical area. Throughout, its width, depth and general shape vary drastically Because of this it is almost impossible to calculate the volume of water carried through the entire river.

The catchment area of the river is in the Himalayas. The river flows from west to east (while the country lies north to south), its average gradient being 9·5 cms. per km. The right and left banks of the river differ from each other. The right bank is generally steep and is 8 15 metres high during dry months. The left bank is flat and low but where it is formed of hard gravel exposures it rises to 10·12 metres from river bed.

The volume of water flowing through a particular place varies according to the season Thus, during the winter due to freezing of the water at the Gangotri glacier, the flow is reduced to a great extent. In summers the ice melts and the glacier discharges a greater volume of water. The Ganga has the highest volume of water during monsoons because of addition of rain water in catchment area.

In the Indian mind the Ganga is intimately associated with spiritual values Yet Ganga has been subject to various kind of pollution, also the recurrent floods have been causing untold loss of life and property with resultant misery.

With urbanisation and various development activities, construction of roads, dams, reservoirs, canals, hydroelectric power stations, industrialisation, etc , mostly after independence, the Ganga and its basin have come to suffer in several stretches from various types of eco-degradation—(i) Ganga basin from soil erosion, water-logging, salinity, alkali and floods, (ii) Ganga river from silt, municipal and industrial effluents. The Central Ganga Authority, and the various agencies including some Universities, and Pollution Control Boards are concerned mainly with municipal and industrial effluents. So far as municipal and industrial effluents are concerned the problem is clear. The effluents could be given suitable treatment and after they have been freed from toxic factors, if any, and the various parameters have reached the permissible limit, the treated effluents should be gainfully used to the maximum for fish culture and for irrigation of gardens and farms in cities and villages, the excess could be released into the river.

Coming to the problem of silt in the Ganga we find that the annual sediment load of the river is very high, next only to the Yellow river of China. A look at Table-1 reveals that the annual sediment load of Ganga is about 1·5 billion tons, only 0·1 billion ton less than the Yellow

TABLE-1

Sediment load of selected major Rivers

River	Countries	Annual sediment load (Million Metric Tons)
Yellow	China	1,600
Ganga	India	1,455
Amazon	Several	363
Mississippi	United States	300
Irrawadi	Burma	299
Kosi	India	172
Mekong	Several	170
Nile	Several	111

Source—Brown and Wolf (1984).

river. Mississippi which has almost the same discharge as Ganga carried has just about 0·3 billion tons of silt. It is evident that Himalayas are one of the most critical watersheds in the world and in taking up any development activity there, especially construction of large dams, great caution has to be exercised. In this regard the decision makers must take note of the following—

i) Siltation of irrigation water reservoirs, dams, canals, tanks which reduces their effective life, is a very serious problem in our country.

ii) The observed rate of siltation of dams is much faster than it was estimated by the designers (Table-2).

iii) Large dams are not only costly but require (a) deforestation of thousands of hectares and (b) displacement of thousands of persons. It is estimated that from 1952 onwards 4 lacs hectares of forest land had to be deforested for the construction of dams.

iv) Thousands of hectares of cultivated land, uncultivated pastures and forest land are lost in dam construction.

TABLE-2

Observed sedimentation rate expressed as a percentage of designed sedimentation rate for some selected River Valley Projects in India.

Name of River Valley Project	Observed sedimentation rate expressed as a percentage of designed sedimentation rate(%).*
Tung Bhadra	420
Bhakra	143
Hirakund	143
Ramganga	410
Nizam Sagar	2290

* Computed from the data given in "Hand Book of Sedimentation" Govt. of India, Ministry of Agriculture, New Delhi—1972 pp. 7-8 & 7-9.

v) Natural water regime of the area may be changed and may give rise to earth tremors. North Konkan halmet of Khardi (107 km. from Bombay) may be cited as an example. It is said that the erection of large retaining dams across the *Tansa*, *Vaiterna* and *Bhatsa rivers* on flanks of Khardi village changed the natural water regime of the area and gave rise to tremors.

vi) The Koyna earthquake is regarded as one of the best example of reservoir-induced seismicity. The connection between rising water level and the tremors therefore needs our attention.

In the light of the above it is but natural that doubts should lurch about the soundness of the large dams. The system of small tanks, which sustained Indian agriculture for hundreds of years, needs a critical look.

The construction of water reservoirs and canals without observing the basic principle that "irrigation and drainage go together' have done great harm. Many civilization were ruined due to the neglect of the above principle. Egypt, Iraq, Iran, Pakistan have suffered badly because of this negligence. The studies made by ISOG team at Gurukula Kangri University show that large tracts of land covering hundreds of square Kilometer have been degraded following construction of reservoir and canals. Even during the period of construction work erosion increased and ate into the villages resulting in enormous soil loss Seapage. water logging and floods extended into new areas. There are reports that villages so far relatively safe have been exposed to floods

The only way the huge soil loss can be reduced or controlled is through heavy tree plantation, Planting suitable plants, suitably and in suitable places, providing necessary after-care so as to ensure their protection, survival and proper growth, is a stupendous task, critical to the health of the river system and the basin.

Cover Page Photographs :

Pollution of Ganga at Hardwar

(Top) : Vishnu Ghat Nala carrying the city-effluents into the Ganga at Hardwar.

(Bottom) : Lalta-Rao Nala flowing into the Ganga near Arya Samaj Mandir, Hardwar. The Dhobi Ghat, a common sight on the banks of Ganga is a perpetual source of pollution.

In 1984 a car was swept in the Lalta-Rao Nala to be finally dumped into the Ganga during a brief spell of rains.

'Arya Bhdtta', 1686
Vol. V. No —I, p. 9

Population Pressure and Environmental Pollution—Its Human Consequences

(Contributed to National Seminar on Ganga Pollution, G.K. University, Hardwar (1986)

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Botany Department, University of Allahabad, Allahabad

The gravity of ecological threat resulting from population pressure all over the world has generated lot of scientific and popular concern in diversified quarters ranging from environmentalists, demographers, policy makers, planners to a layman on the street. Because of scientific and technological advancement, man has gathered unprecedented power and has virtually conquered the nature. We can alter the course of rivers, convert deserts into fertile land, move mountains, control various environmental hazards like famine and floods on the one hand and on the other hand through excellence in the medical field the death rate is checked to a satisfactory proportion Our advancement has now extended into other biosphere also Moreover, man's indiscriminate plundering and unrational use of power has disbalanced the previous harmonious man environmental relationship which has possible detrimental consequences The unabated rise in the population, the fast depletion of natural resources, the increase in environmental pollution etc., all are related directly with mankind s future. We shudder to think about the fate of human in 2000 A.D. if man-environment balance is not maintained on a war footing. The forecasts by Ehrlich and several others about Eco catastrophe is thus, to be seen in the years to come.

---

* *Psychology Department, University of Allahabad, Allahabad*

There are mainly three types of relationship that man has witn nature :

(a) Domination over nature

(b) Harmony with nature

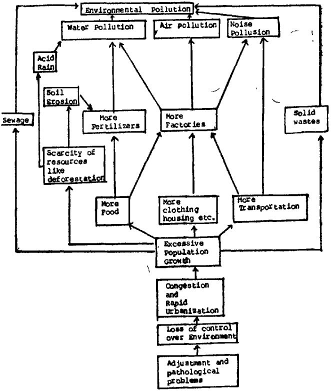
(c) Subjugation to nature

Psychological stress is usually not experienced when the persons are either in harmony with the environment or when they have domination over the environment. Where there is harmony, the environment accommodates the social and spatial needs of the individual. Furthermore, when there is domination over the environment, individuals have freedom of choice and control to alter the environment and to fit their social and spatial needs accordingly But when the individual is subjugated to the environment as the situation is today, they lack control over their immediate surroundings and environment places a tax or constraint on the individual. If this situation is prolonged the individual adaptation capacity which is limited is shrinked and adjustment problems become prevalent Today, scientific advancement has shrinked the world People living in any part of the world have become anxious, alienated, unhappy, uneasy and bewildered because they have started perceiving that there need are not synchronous with the constraints of the environment and thus show signs of maladjustment.

Population Trend and Hypothetical Projection

The pressure of the population on the earth is increasing in the frightening proportion every day, and thus is presenting a dark and grim picture of the future world The population of the world in 1860 was 1 billion; in 1930 it became 2 billion; in 1970 the population touched 3 6 billion and currently the world's population has crossed 4 billion The demographic forecasts of experts reveals that although a decline in population is now taking place, but then, the hypothetical projection of the population in 2000 A.D. is estimated to be a staggering 6·35 billion. Similarly, hypothetical projection by many economists indicate that India's population will touch a thousand million mark by the turn of this century.

Rapid urbanization is the consequence of excessive population growth in India and in other countries. Today cities have become crowded and congested because of high population density. It is at best unpleasant and avoiding and at worst dangerous and dehumanizing.


Environmental Pollution
Water Pollution
Air Pollution
Noise Pollusion
Acid Rain
Soil Erosion
Sewage
More Fertilizers
More Factories
Solid wastes
Scarcity of resources like deforestation
More Food
More clothing housing etc.
More Transportation
Excessive Population Growth
Congestion and Rapid Urbanisation
Loss of control over Environment
Adjustment and pathological problems

Model depicting the relationship between excessive population growth, environmental pollution and human consequences.

If all that were not bad cities are rapidly changing from bad to worst. This fact is strengthened by the comment of the Chief Minister of Maharashtra recently "We can't create additional civil facilities and we cannot push the Arabian Sea back". If the exodus from rural to urban continues in this unabated manner then metropolitan cities will become a hell of a place to live in. Today on the one hand multistoreyed buildings are seen in which people live like animals in cages and on the other hand slums are increasing which are said to be the breeding ground of anti-social elements which instigate crimes, riots, distrurbances and so forth. If urbanization is not stopped immediately then future of the Indian cities will become very sordid and grim in 2000 A.D. Thus, population pressure causes several adjustment related problems in humans on the one hand and on the other leads to environmental pollution.

External environmental faces pollution when noxious and contaminated substances emanating from industries, chimneys, automobiles and so forth, gets mixed with water, air and soil and adversely affects the natural spirit of the biosphere. The mojor thrust of this paper is to discuss at length the water, air and noise pollution and its human consequences. In addition, how to reduce or ameliorate the adverse effect of environmental pollution.

(a) Water Pollution

Water is the main source of life which covers more than seventy per cent of the world populace. Water pollution is the result of man's merciless exploitation of water. It is caused from (i) domestic wastes of the general public which includes sewage water and solid wastes and (ii) the wastes from industries in the form of toxic substances, minerals and chemical substances etc. The sewage wastes are dumped in the rivers and ponds in a disproportional ratio and thus pollute the water, increasing the propensity of various pathological diseases like dysentry, tuberculosis, typhoid and cholera and so forth. The wastes coming out form industries presents a grave danger to sea vegetation and aquatic life.

From Deforestation to Afforestation

Our green and dense forests are of inestimable importance for the water cycle, for our climate, for maintainig the fertility of the soil and for our health Forests produce many millions of tons of oxygen every year and filter and purify the air. But today by man's indiscriminate destruction of forests frightening problems like environmental pollution, soil erosion, floods etc. are at increase everywhere in the world. A report of recent survey indicates that in India nearly ·15 million hectare forests are extripated from the soil every year and thus 40 million hectare of land is severely affected by floods which places crores of financial burden on the people and government.

Today because of constant increase of carbon monooxide in the air, the air above the earth is becoming poisonous. This has increased the temperature of the biosphere around 2 to 3° and thus has adversely effected the photosynthesis process of the plants. Million tons of pollutants have been decended on the earth every year in which one-fifth of this amount is sulphur dioxide that very probably triggered off the dying of trees. This pungent smelling gas which is produced primarily in commercial burning of oil and coal, has been coming down as acid rains. A big part of South India, South-East Asia, East China and several other nations are affected by acid rain. Thus, a need is to check the further increase of SO_2 and CO_2 in the air because it produces a deliterious effect on human health and adjustment. According to Dr. Baker, an individual emits approximately 400 litres of CO_2 everyday in the air and nearly 16 trees are needed to produce requisite O_2 essential for a man. Thus, forests are very important for human survival because man and environment are inseparably locked with each other and are interdependent in nature.

It is a naked reality that human survival dependent on green dense forests and trees and if the forests are indiscriminately brought down, human's very existence is seriously under question. The awareness to protect the forest was spearheaded by Sri Sunderlal Bahuguna in 1973 and 'Chipko' movement gathered momentum, Today, government through various constitutional amendments like Article 48A, 51A is trying seriously to protect the ecology and afforestation, is being propogated everywhere in the country. Today awareness to protect the environment has begun to take place in other parts of the country. For instance, Silent Valley Hydro-Electric Project which had threatened to destroy the ecology of Kerala is being scrapped by the government because of severe mass resistance and Appiko movement in Kerala became successful. In addition, to balance the man environment relationship the govenment should make compulsory environmental education in the schools and colleges should create social awareness through mass media about the importance of tress and forests. This will bring a change in people's attitude and protection of environment will become not a individual but a mass movement. All these efforts will ameliorate the aversive effects of pollution.

acred Ganga in Danger

It has been forecested by many scientists that if pollution of Ganga water is not stopped immediately, it would cross a point of saturation by the turn of this century and will threaten the human existence. Ganga today is considered one of the most polluted rivers of the world travels more than approximately 2,500 km from its origin point and falls in Bay of Bengal. The sordid state of Ganga, as far as pollution is considered begins from Haridwar when solid wastes of B.H.E.L. falls in Ganga, The water of Ganga is moderately polluted between Rishikesh and Kanpur. But in Kanpur where industrialisation is at its zenith with more than 45 leather, 10 cotton mills and countless small cottage industries, the water of Ganga changes its complexion and becomes extremely polluted because Industrial wastes are dumped directly in Ganga without any preventive checks. The wastes emanating from different industries heighted the percentage of carbonic substance which in turn reduces the oxygen percentage. Research indicates that 16 km of Ganges water is adversely affected by the waste products of IFFCO at Allahabad. In Varanasi, Ganga becomes extremely polluted because more than 70,000 devotees take a dip in the Ganges. Moreover, more than 400 parts of dead bodies and 10,000 dead bodies of animals are floated in the holy water which affects the purity of the water adversely. In addition to this approximately 12 crores tons of sewage water and nearly 40 lack litres of waste diesel products are dumped in Ganga. Thus, today the water of sacred Ganga has become undrinkable in Varanasi. The water of Ganga has reached a highly aggravating state in Calcutta where more than 150 big industries like jute mills, cotton mills, leather mills, liquor industries send their waste substances directly in Hooghly. Thus, disturbing greatly the acquatic life.

In Indian religion Ganga is considered as goddess and is equated with mother. Our religion believes that an individual is liberated from bondage and his all sins are pardoned if he takes a dip in the holy river. It has also got many medicinal qualities. But non-stop dumping of industrial waste in the form of toxic and chemical substances and sewage water has polluted the water beyond limit According to international standard of the number of Decious cliform virus increases by 500 in 100 cubic meter the water becomes undrinkable and poisonous, Unfortunately, the bacteria phase has increased beyond specified limits in Ganga water and thus it is dangerous to use the Ganga water. Pasricha and deMonte (1980) suggested the use of bacteriophases as an index of water contamination and observed that Ganga water in Calcutta region had bacterio phases of Salmonella typhinurium, shigella dysenterias and vibrio cholerae. The results found the occurrence of bacteriophases in 48 samples of Ganga water collected from various places extending from Hardwar to Haldia on the Bay of Bengal.

According to Mukherjee, Dhara and Sen (1984) Ganga water contains significant amounts of organic matter which may support microbiological growth. Since Ganga water retains its qualitv for a long time without visible signs of fermentation, it would appear that one way by which the bacterial population is controlled in Ganga water may involve the activity of bacteriophases. In addition to this, arrangements should be made to divert the sewage water towards farms and vegetable field instead of dumping it in the Ganga. This would decrease the pollutton. So steps must be taken immediately to check the sewage water from going in Ganga and thus protecting its ancient heritage.

Air Pollution

Air pollution is a silent killer and effects the human health and efficiency adversely. Atmospheric impurities is heightened in today's world by the emission of poisonous gases like carbon monooxide, sulphur dioxide, nitrogen oxide, exhaust emission from motors, scooters, factories, industries etc. which places harmful effects on human's quality of life and well being. The world's greatest industrial catastrophe took place on the ghostly midnight of 2nd and 3rd December, 1984 at Bhopal, where leakage of poisonous MIC gas in the air engulfed more than 3000 people in a merciless manner. More than one fourth of the population got affected by the leakage of the gas from the Union Carbide factory. The scientists believe that MIC is kept at 99.5% purity level and .5% phosgene is permissibly intermixed in it. Thus, in Bhopal the probability of phoşegene emitted in the air was 40 kg. and MIC was 40 ton. The world Health Organisation has estimated that 300,000 people are poisoned by pesticides every year only in the Third World. The atmospheric survey of metropolitan cities reveals the presence of several toxic substances in the air which elevates the probability of various respiratory diseases. Million tons of pollutants have been descending every year from the air in which SO_2 ions good proportion which very probably triggered off the dying of trees and producing acid rains.

Ways to Alleviate the level of Air Pollution

Generally, two ways are suggested to remove SO_2 from the emission produced by power plants and other industrial installations—

(a) Filtering emissions through fime filters. This process is proved effective in commercial use and it removes all the noxious gas.

(b) Burning a mixture of powdered coal and lime. The sulpher in the coal reacts with the calcium in the lime to produce calcium sulphate for gypsum.

(c) Reducing of car exhaust emission catalytic converters together with lead free fuel is employed.

All these processes are useful in checking air pollution but are highly expensive and would result in raising prices on products accordingly. Many Botanists have also attended to check the air pollution but searching in plants which have pollution resistance capacity. It has been found that the leaves of roses are spungy and had the inherent capacity to inhale the poisonous gas. Thus, it is suggested that plantation of roses should be given importance because it is very cheap and effective.

Noise Pollution

Noise today is inescapably showdowy public enemy which has engulfed every nook and corner of urban life. Noise emanating from transportation, lottery ticket sellers, radio, loudspeakers and industries have contaminated the atmosphere and has increased tension, irritation and uneasiness in human beings. On a recent study conducted by Nagar and Pandey (1985) it is reported that high noise (94 db) on the one hand is stressful and on the other placed a tax on individual's cognitive capacity and generates negative feeling towards others In addition to this crowded and high population density also leads to cognitive impairement and various adjustive problems in the individual exposed to it, for a prolonged period of time. Thus, one can infer that loud noise in the market and urban centres impairs brain activity, reduces thinking and create irritability, tiredness and signs of anxiety.

In conclusion, it can be inferred that one of the prominent causes of environmental pollution and adjustment problems in humans is the unchecked population explosion. Today man is recklessly exploiting and churning the nature, fully blind about its possible aversive effects. Nature and man are interdependent and nature never permits any domination of man. Today environment is taking its revenge in a sense that scores of people, animal species are destroyed by untimely floods, leakages of poisonous gases, famine and so forth. By the unchecked population expansion, limited resources are consistently depleted. So there is a mis-match between increasing population and limited resources, thus inflation and decreased quality of life is spreading like malignent cancer. Thus it has now become essential to check population from further expansion, to take precautionary steps to alleviate pollution, to stress on plantation and afforestation, so that man–environment harmonious balance is once again established.

ACKNOWLEDGEMENT

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'Aryabhatta', 1986
Vol. V, No -1 p. 18

Characteristics of Major Sewer Drains Entering into Ganga at Hardwar

(Contributed to National Seminar on Ganga Pollution, G.K University Hardwar (1985)

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The present investigations were made in order to assess the quality of effluents of three major sewer drains, i.e., Naisota, Lalta Rao, and BHEL–Jwalapur Drain, in relation to pollution load discharged by them into the Upper Ganga Canal at Hardwar. The studies revealed high values of physico-chemical and bacteriological parameters, except DO. BHEL–Jwalapur drain at Jwalapur showed the maximum load of pollution.

Introduction :

Hardwar the holy gateway to Shiva's abode in Kedarnath and Vishnu's at Badrinath is situated at the foot hills of Shivalik range on the right bank of Ganga Ganga originates from Gangotri and coursing through Himalayas it descends on the plains at Hardwar. The pollution load in the Ganga upto Rishikesh seems to be insignificant except at certain sites. But as it passes through Rishikesh and Hardwar the city domestic wastes and industrial effluents start threatening the quality of the Ganga water.

Hardwar is dotted by several Ashrams, Akhadas, Dharamshalas and temples and is therefore, called the city of temples and Akhadas.

There are about ten major and small drains entering into Ganga at Hardwar. In the present study only three major drains, i.e., Naisota, Lalta Rao and BHEL-Jwalapur drains have been taken into account (Fig. 1). There are several accounts from India and abroad of the quality of sewer drains and their impact on the receiving rivers or lakes. Verma *et al.*, (1978) studied the physico-chemical and biological characteristics of Kadrabad drain at Modi Nagar, and K.D. Sharma *et al.* (1981) studied the water quality of sewer drains entering into Yamuna at Agra. Similar work has been reported from Delhi (Dakshni and Soni, 1979), S.K. Agarwal (1983) worked on the water quality of Kota city sewer drains entering into Chambal river. Significant contributions have also been made in this field by several foreign workers, *e.g.* Ellis (1937) and Klein (1973).

Topography and Location of Drains

There are about ten drains which discharge their pollution load into the Ganga at Hardwar. Out of these some are seasonal and others are perennial. Three major drains under reference are shown in (Fig. 1) and described below :

1. Nai Sota Drain :

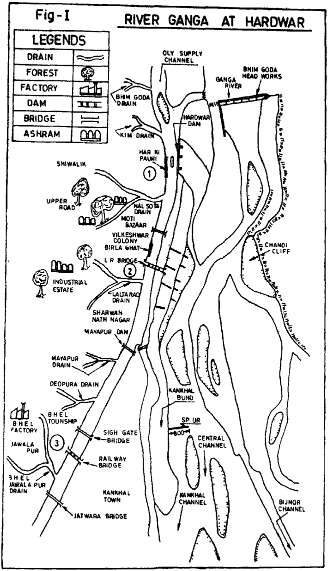
This drain evacuates into Ganga in between Harki Pauri bridge and Subhash Ghat near Subhash Statue. It brings the domestic waste of thickly populated colonies like Moti Bazar, Tonga Stand and other sites along Upper road as Dharamshalas, Ashramas, Hotels, Restaurants etc. The drain is situated at the right bank of the Ganga. The flow in this drain was observed much higher in summers and rains as compared to winter. This was obviously due to the floating population of pilgrims and tourists and to storm water. The discharge of this drain swells significantly due to rain water streams descending from the Shivaliks. During rains the sewer line getting blocked with silt results in the diversion of all city effluents into Naisota and other drains which empty into the Ganga, Shanker (1983-1984).

2. Lalta Rao Drain :

This big drain merges into Ganga near Birla Ghat. It directly carries the domestic waste of Sharwan Nath Nagar and newly constructed colonies, i.e., Bilkeshwar and its nearby areas along with industrial waste of Hardwar industrial area situated near Bilkeshwar colony, 'into Ganga. The Lalta Rao Nala has its origin in the Shivaliks. The two

Fig-I

RIVER GANGA AT HARDWAR



streams Shiv Dhara and Bilkeshwar Dhara descend from the Shivaliks and meet at the foothills near Bilkeshwar colony forming Lalta Rao drain which passes through the city and merges into the Ganga The above streams carry heavy silt load during rains which is deposited in the Ganga Canal.

3. BHEL–Jwalapur Drain :

This is one of the biggest drain which discharges a heavy amount of untreated domestic and industrial city wastes into Ganga in between Railway bridge and Jatwara bridge at Jwalapur. Besides the domestic waste from Jwalapur, the drain also carries the waste water from the Govt. of India Undertaking B.H E.L. (Bharat Heavy Electricals Limited) which is located at the foot of Shivalik hills at Ranipur. B H E.L. has its own township having an approximate population of fifty thousands. Moreover, a number of small scale industries and ancillaries have been set up around B.H.E.L.

Material and Method :

The samples from each drain were collected before they discharge into river. The sampling was done at an interval of 30 days from January 1985 to May 1985. The samples collected were brought to laboratory for analysis of various physico-chemical parameters (Table-1) The DO was estimated at the site by both the methods, i.e, by titration and DO meter. The bacteriological samples were collected separately in sterilized bottles. Bacteriological parameters SPC and MPN index were estimated as per serial dilution multiple tube methods. The analysis was made as per APHA (1980).

Result and Discussion :

The data in respect of parameters studied have been presented in Table-1. The colour and odour parameters were assessed by visual and smell. The colour of BHEL–Jwalapur drain was always observed dark blackish having pungent foul smell as compared to other two drains, i.e. *Nai Sota* and *Lalta Rao* The black colour was due to the mixing of ash from T.P.S. plant of BHEL. The colour of the three drains was observed muddy in rainy season owing to mixing of soil washings. Weller House (1978) also reported similar findings The pungent smell of BHEL–Jwalapur drain in comparison to others was observed due to anaerobic decomposition of organic matters as evidenced by low oxygen contents of the effluents. An oily layer was sometimes found

TABLE-I

Physico-Chemical and Bacteriological characteristics of major sewer drains of Hardwar

Sl. No.	Characteristics	Nal Sota Drain		Lalta Rao Drain		Jwalapur–BHEL Drain	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1.	Colour	SB.		SB.		DB.	
2.	Odour	SPS.		SPS.		PS.	
3.	Temperature °C	19·0	30·0	18·6	34·0	29·0	36·0
4.	Turbidity NTU	26·0	136·0	30·0	147·0	136·0	450·0
5.	pH	7·6	8·2	6·41	8·37	6·54	8·50
6.	Conductivity in μmhos	0·140	0·282	0·200	0·598	0·232	0·630
7.	Discharge L.P.M.	16·0	44·0	90·0	110·0	18000·0	32000·0
8.	Total hardness as $CaCO_3$	84·0	192·0	152·0	480·0	156·0	500·0
9.	Total dissolved solids	450·0	860·0	980·0	1620·0	1136·0	2050·0
10.	DO	1·4	4·5	1·7	5·8	Nil	1·3
11.	BOD	21·0	136·0	29·8	106·0	88·0	226·0
12.	COD	64·0	132·0	81·9	199·0	140·0	271·9
13.	Sulphates	3·8	14·0	4·0	12·8	11·5	13·5
14.	Chlorides	4·0	22·0	4·9	32·0	23·0	57·0
	Bacteriological						
15.	Standard Plate Count/ml $\times 10^5$	46·0	168·0	24·0	186·0	80·0	240·0
16.	MPN index/100ml $\times 10^4$	21·0	220·0	19·0	150·0	210·0	2400·0

Values are in mg/l otherwise stated. SB = Slight Blackish, DB = Dark Blackish, PS = Pungent smell, SPS = Slight Pungent smell, LPM = Litreo per minute.

floating on waste water surface, Soyato (1976) made similar observations in his study.

The values of turbidity in *Naisota, Lalta Rao* and BHEL-Jwalapur drains were observed in the range of 26·0—136·0, 30·0—147·0 and 136·0—450·0 NTU respectively. Thus the turbidity of BHEL-Jwalapur drain was found much higher in comparison to other two drains. It was all due to mixing of ash from TPS which resulted in the increase in suspended solids (Verma and Shukla—1964).

A marked variation was observed in the values of temperature of Jwalapur drain in comparison to the temperature of *Naisota*, and *Lalta Rao* drains. It was observed in the range of 19·0—30·0, 18·6—34·0 and 29 0—36 0. The higher temperature in the Jwalapur drain effluent seemed to be due to discharge of boiler feed water from T.P.S. plant According to Lecleric (1964), high temperature of effluents is detrimental to aquatic fauna and flora of receiving water. It is clear that down stream of such discharging points will occur both an increase in the temperature of the river water resulting an increase in the degree of pollution.

In the present study the pH was observed in the range of 6·41—8·50. The high pH in BHEL-Jwalapur drain was possibly due to heavy discharge of coal ashes and industrial effluent of higher alkalinity by ancillaries and other small scale industries. Roberts *et al* (1940) reported the same findings in his studies.

Dissolved solids are mainly composed of carbonates, bicarbonates, sulphates, nitrates and chlorides inorganic substances. In the present investigation the values of sulphates and chlorides were observed in the range of 3·8-14·0, 4 0-12·8, 11 5-13·5 (sulphates), 4 0-22 0, 4 9-32 0, 23 0-57 0 mg/l. (chlorides) respectively in Naisota, Lalta Rao and BHEL-Jwalapur drains. The values of these parameters were always obtained high in BHEL-Jwalapur drain rather than Naisota and Lalta Rao drains, which showed direct relationship with dissolved solids. Prasad and Saxena (1980) also found that pollution load is directly related to or proportional to dissolved solids.

The parameters DO, BOD, and COD are important in the assessment of degree of pollution. The DO reflects physical and biological processes prevailing in the water. The BOD and COD give a qualitative index of biodegradable and biologically inert organic substances. In the present investigation the data revealed that the values of DO were low ranging from 1·4-5·8 mg/l only, while in the case of BHEL-Jwalapur drain it was found nil. Dakshni and Soni (1974) also reported similar conclusions in their studies. The higher values of BOD and COD confirm this fact, and are in full agreement with the study of Stammer (1959) who concluded that BOD was indirectly proportional to dissolved oxygen.

Among the bacteriological parameters Standard Plate Count (SPC) and MPN index were determined. The determination of these parameters enjoy a special status in pollution studies as it is a direct measurement of deleterious effect of pollution on human health. The Standard Plate Count (SPC) provides a standardized mean of determining the population of heterotrophic bacteria while Most Probable Number (MPN index) signifies the number of coliform organisms. In the present investigation of values of Standard Plate Count and MPN index × 10^3 were observed 46·0-168·0, 24·0-186·0, 80·0-240 × 10^8/ml (SPC) and 21·0-220·0, 19·0-150·0, and 210-2400 × 10^2/100 ml (MPN) respectively in Naisota, Lalta Rao and BHEL-Jwalapur drains. The results clearly indicate the BHEL-Jwalapur drain showed higher values in comparison to other drains. The high values of total count and MPN index in BHEL-Jwalapur drain directly reflects the high organic pollution load. (Kabler 1959).

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Defiled Ganga and Polluted Environment : India's Ecological Tragedy

(Contributed to National Seminar on Ganga Pollution, G.K. University Hardwar (1985))

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ABSTRACT

Recognizing the absolute importance of environment for the preservation and the development of human life and its cultural heritage, the Indian sages deified all important objects constituting life's environment. The Sun, the Moon, the stars and the wind and the plants, trees and the rivers and mountains have all been either described as gods deserving adoration and worship from man or their origin has been described as being divine, investing them with the same worshipful divine status. This was only to place the strongest obstacles before man that would discourage him to treat his environment lightly or to proceed to destroy or defile it thoughtlessly. The planting of trees was considered a very virtuous and holy act and not a routine agricultural act.

Soot tells sages in the Matsya Purāna a way to plant trees that make the whole act a sacred and religious ritual. He says that trees should be planted after having arranged for a Ritwij, a Mandap, incence and other articles for a Homa. Soot also assures them that the act of planting of trees endows one with religious merit 'bringing fulfilment of desires and securing a place in heaven for a period exceeding the life-span of three Indras.

Some plants, herbs and flowers etc. have been said to have sprung or originated from the different parts of the bodies of different gods.

The Indian sages have also revealed the medicinal and life-bestowing properties of plants and herbs. In fact, this is the foundation of Ayurveda, the Indian system of medicine.

The Indian sages, blessed with divine vision have praised some of the rivers exalting them to divine status and singing their glories for having miraculous powers to wash off sins, to confer boons and to grant Moksha to those who bathe in them, drink their water and worship them.

It is a standing shame to the inheritors of India's cultural and ecological heritage that the Ganga, which Lord Shiva gladly received on His head is now, at many places not fit for a dip by even an ordinary mortal. The divine river, that not very long ago, was an object of worship and was revered as having the potential of showering blessings and removing sins is now, by and large, an object of tourist interest with commercial potential. The great Indo-Gangetic plane which was made famous in history by the fertile waters of Ganga now depends more on tube-wells and pump-sets. The mammoth demon of industrial expansion is rushing menacingly to divest her of her religious sanctity and to convert her into a viaduct for poisonous industrial effluents, city garbage and the filth of the urban sewage pipes and septic tanks. The Ganga has been defiled and modern progress has made a very thorough job of it.

Our spiritual leaders and yogic texts explain that our external environment is merely a projection of our own inner mental condition and thought patterns. If our external environment is defiled, it is only because our own inner consciousness is impure and our minds are cess-pools of selfishness, greed, anger, passion, enmity and a thousand and one desires that we would be ashamed to admit openly. Just as we keep pushing this dirt into our subconscious minds that constitute our natural personality, similarly we keep burying our filth in the Ganga.

When the inner pollution is removed and the radiance of the soul illumines the consciousness, Man and Nature will immediately strive to bring about a corresponding change in the outer environment also.

INTRODUCTION

Whether a plant flowers or withers prematurely, whether it is crowded out by other plants or holds its own, depends essentially on the environment. The same is true of a human being or a particular human community. Environment is not simply the outside world, thought of as something that surrounds us. If we think of it in that way, we underestimate its role. In fact, the relation of life and environment is quite intimate. The capacities and attributes of an organism are relative to the whole environment in which they manifest themselves. Every change in a living being involves some change in its relation to environment, and every change in the environment, some change in the response of the organic being.

Our environment is our habitation in the completest sense. Every change of environment means a change in our habits, our ways of living. On the other hand, our habits, our ways of living, insofor as they differ, create for us a different environment, a different selection within it and a different accommodation to it. Through a process of constant selection and constant adaptation, the moving equilibrium of life is maintained. The more plastic the life, the more is it at the mercy of environment, save is soforas it learns to control the environment for its purposes Man, the most plastic of animals, has therefore been seeking through unknown ages to make his environment more conformable to his growing needs. The quest of the more appropriate environment is for him, alone, of all the animals, eternal. It is the human beings that are affected most by the stimulations and depressions brought about by the milieu in which they live.

Recognizing the absolute importance of environment for the preservation and the development of human life and its cultural heritage, the Indian sages deified all important objects constituting life's environment. The Sun, the Moon, the stars and the wind and the plants, trees and the rivers and mountains have all been either described as gods deserving adoration and worship from man or their origin has been described as being divine, investing them with the same worshipful divine status. This was only to place the strongest obstacles before man that would discourage him to treat his environment lightly or to proceed to destroy or defile it thoughtlessly. The planting of trees was considered a very virtuous and holy act and not a routine agricultural act. We learn it from a conversation between Rishi Soot and some other sages in the Matsya Purana. The sages ask Soot the way to properly plant trees:

पादपानां विधि सूत यथावद निस्तराद वद ।
विधिना केन कर्त्तव्य पादपोधानं बुधैः ॥

Soot tells them a way to plant trees that makes the whole act a sacred and religious ritual. He says that trees should be planted after having arranged for a Ritwij, a Mandap, incense, other articles for a Homa. Soot also assures them that the act of planting of trees endows one with religious merit bringing fulfilment of desires and securing a place in heaven for a period exceeding the life span of three Indras.

अनेन विधिना यस्तु कुर्याद वृक्षोत्सव बुधः ।
स्र्वानि कामानवाप्नोति फलं चानन्त्यमश्नुते ॥
यश्चैकमपि राजेन्द्र वृक्ष संस्थापयेन्नर. ।
सोऽपि स्वर्गे वसेद राजन यावदिन्द्रायुतत्रयम् ॥

Some plants, herbs and flowers etc. have been said to have sprung or originated from the different parts of the bodies of different gods ·

कंदर्पस्य कराग्रे तु कदम्बश्चारुदर्शनः ।
तेन तस्य परा प्रीतिः कदम्बेन विवर्द्धते ॥
यक्षाणामाधिपस्यापि मणि मद्रस्य नारद ।
वट वृक्षः सम्भवत तस्मिंस्तस्य रतिः सदा ॥

This means that the Kadamba tree originated from the palm of Kam Deva, and the Banyan tree came from Manibhadra, the chief of Yakshas. This is mentioned in the seventeenth chapter of Vaman Purana There are other details at the same place in this regard relating to other trees. For example, Khair is said to have originated from the middle of Brahma's body, from Parvati's palm has come Kunda Lata, Plash and Goolar have come from the right and left side of Yama; Paepal has come from the Sun and Bilva from the hands of Lakshmi. The purpose of endowing the trees, plants and flowers etc., with such mythical holiness is obviously to highlight their great utility to man and to impress upon him the necessity of cultivating and preserving the trees and plants and to protect and to increase his forest-wealth.

The Indian sages have also revealed the medicinal and life-bestowing properties of plants and herbs. In fact, this is the foundation of Ayurveda, the Indian system of medicine. The medical properties of Tulsi, Bel, Haritki, Amla, Garlic—to mention only a few of the thousands of medicinal herbs and plants—are too well-known. The Himalaya is said to be a veritable treasure of such herbs with the mythical Sanjeevani Booti being the Queen of them all.

Similarly, our scriptures are full of hymns extolling glories of various lakes, rivers, mountains and mounds known as 'Silas'. Trees and rivers were beloved of poets and writers like Kalidas, Amar Singh, Bhas and Bharavi. Many western writers have also paid homage to Nature—recognizing the immense good it can do to man and his soul. Shakespeare's lines in "As You Like It' have now become proverbial .

..... this our life, ... ,
Finds tongues in trees, books in running brooks,
Sermons in stones, and good in everything.

Similarly, Wordsworth was so sensitive to the beauties of Nature that he could perceive God's presence in the objects of Nature and could receive messages from them. "Daffodils", "Tintern Abbey", "The World Is Too Much With Us" and "Three Years She Grew" are some of the poems that need mention in this regard.

The Indian sages, blessed with divine vision have praised some of the rivers exalting them to divine status and singing their glories for having miraculous powers to wash off sins, to confer boons and to grant Moksha to those who bathe in them, drink their water and worship them. Ganga, Yamuna, Saraswati and Narmada are the most outstanding rivers in this respect. It is said in Chapter 186 of Matsya *Purana that* :

पुण्या कनखले गंगा कुरुक्षेत्रे सरस्वती ।
ग्रामे वा यदि वारण्ये पुण्य सर्वत्र नर्मदा ॥

That is Ganga is sacred at Kankhal and Saraswati at Kurukshetra. But Narmada is holy everywhere, whether in a village or a forest. It is also said that,

त्रिभि: सारस्वतं तोयं सप्ताहेन तु यामुनम ।
सद्यः पुनति गांगेयं दर्शनादेव नार्मदम ॥

This means that one is purified by drinking Saraswati's water for 3 days and Yamuna's water for 7 days Ganga water is an instant purifier when drunk But Narmada water purifies even with its Darshan or mere seeing of it.

However, it is the Ganga that occupies the highest place in India's ecological milieu

The mythology surrounding Ganga is vast and very devotional. It is said to have originated from the feet of Vishnu and to be of the form of Vishnu Himself :

विष्णुपाद प्रसूतासि वैष्णवी विष्णुदेवता

The 3 $^1/_2$ crore gods that reside in the outer space according to Vayu Devata are in fact present in Ganga : (Chapter 102, Matsya Purana).

तिस्त: कोटयोऽर्ध कोटी च तीर्थानां वायुरब्रवत्ति ।
दिवि भूम्यन्तरिक्षे च तानि ते सन्ति जाह्नवी ॥

The Adi Kavi, sage Valmiki addressing himself to Ganga in a very touching and prayerful manner in his well-known Ganga-Ashtak :

गांगवारि मनोहारि मुरारिचरणच्युतम ।
त्रिपुरारि शिरश्चारि पापहारि पुनातु माम ॥

He prays that O thou Ganga water, who art charming and art the feet of Murari and Achyut, and art flowing through the hair of Tripurari Shiva, please bless me, purify me !

It is a standing shame to the inheritors of India's cultural and ecological heritage that the Ganga, which Lord Shiva gladly received on His head, is now at many places not fit for a dip by even an ordinary mortal. The divine river, that not very long ago was an object of worship and was revered as having the potential of showering blessings and removing sins, is now, by and large, an object of tourist interest with commercial potential. The great Indo-Gangetic plane which was made famous in history by the fertile waters of Ganga now depends more on tube-wells and pump-sets. The mammoth demon of industrial expansion is rushing menacingly to divest her of her religious sanctity and to convert her into a viaduct for poisonous industrial effluents, city garbage and the filth of the urban sewage pipes and septic tanks. The Ganga has been defiled and modern progress has made a very thorough job of it.

Apart from Ganga, the great Himalayas and their forest wealth have also been desecreted and plundered. Forests are being increasingly felled and the mountains denuded, offering a red carpet to floods. The dust raised by the grinding wheels of factories and the smoke emitted by their chimneys pollute the air and are fast becoming health-hazards. A few years back some children of Rajpur at Dehra Dun wrote to Mrs. Gandhi, complaining that they had not seen the Sun or the stars for more than a week because of ugly screen of smoke and dust spread by the adjoining factories.

This senseless policy is taking a heavy toll of India's once rich and beautiful natural environment. In fact the eco-system in India is becoming increasingly hostile to man and beast alike.

The mindless planning and governmental apathy or irresponsibility are no doubt largely responsible for this state of affairs. Some believe that these are the only causes, but I feel differently.

Our spiritual leaders and yogic texts explain that our external environment is merely a projection of our own inner mental condition and thought patterns. If our external environment is defiled, it is only because our own inner consciousness is impure and our minds are cess-pools of selfishness, greed, anger, passion, enmity and a thousand and one desires that we would be ashamed to admit openly. Just as we keep pushing this dirt into our subconscious minds that constitute our natural personality, similarly we keep burying our filth in the Ganga.

In fact, the true Ganga is our own consciousness. The mythology says that Ganga originated from the feet of Vishnu. The scriptures repeatedly call Vishnu as the Guru and also as Vasudeva: He who dwells everywhere. The place of the Guru's feet is in one's head according to Sri Aurobindo and other yogic Masters. As Vasudeva, Vishnu resides in the hearts of all beings :

'ईश्वर सर्वभूतान हृददेशेऽर्जुन तिष्ठति'

as the Gita says.

According to Kularnowa Tantra, the best water or Arghya offered in worship, is in fact, the water of the currents of our Chetna. The Tantra calls the Divine Mother as

'चैतन्यार्ध्य समाराध्या'

It, thus very logically follows that the Ganga flowing from Vishnu's feet, is the current of our own consciousness flowing from our heads and hearts—the seats of our intelligence, mind and consciousness

It is worthwhile to pay attention to Patanjali, who, in his Yoga Shastra has ordained that the disciplines of Yama and Niyama are fori all persons, in all places, and at all times. The educationists and Govt. policy planners and social philosophers should strive to give a yogc and spiritual orientation to our education, thinking, planning and ways of life and sense of values. The way has already been shown by Maharshi Dayananda Saraswati in this regard. It is for us to take to the path.

When the inner pollution is removed and the radiance of the soul illumines the consciousness, Man and Nature will immediately strive to bring about a corresponding change in the outer environment also. Nature, who never foregoes an opportunity to take revenge against the horrors perpetrated on it, will itself become a friendly and smiling helpmate, transforming itself into a natural experience of Lord Krishna's following assurance in Gita:

यो माम पश्यति सर्वत्र, सर्वं च मयि पश्यति ।
तस्याहं न प्रणश्यामि, स च मे न प्रणश्यति ॥

Ganga—The Lifeline

- The Ganga basin is home to more than 37% of the population of the country.

- The Ganga provides livelihood to nearly 1/3rd of the country's population.

- The Ganga basin waters and drains 8 states : Uttar Pradesh, Haryana, Bihar, West Bengal, Rajasthan, Madhya Pradesh, Himachal Pradesh and Delhi.

- The Ganga basin is extensively cultivated. About 47% of the total irrigated area in the country is in the Ganga Basin.

- A variety of crops are raised in the basin: rice, wheat, sugar-cane, cotton and jute.

- More than three-fourths of the annual rainfall in the Ganga Basin occurs in the four monsoon months : June to September.

- The Ganga has been a major source of communication since ancient times. Even now, big steamers ply at Patna and other towns beyond.

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Microgram Determination Of N-N-Dimethylaniline In Water By Spectrophotometric Method

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INTRODUCTION

In our another communication$^{(1)}$, the microgram determination of aniline in water has been discussed. Substitution of alkyl or any other groups at the nitrogen, modifies the activity of aniline, but the products still behave qualitatively like unsubstituted anilines $^{(2)}$, So these are equally dangerous and should be detected and determined in waters carrying the effluents of Chemical Industries wherein anilines are used for the manufacture of azo dyes, resins etc. N-N-dimethylaniline (DMA) is soluble in microamounts in water. But the solubility may improve in a little acidic medium or in presence of organic solvents which are also used for the preparation of some chemicals from DMA and are miscible in water.

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DMA is used in the preparation of azo dyes and other important chemicals (3,4). So the presence of DMA in water containing dyes and other Chemical Industry effluents, can not be avoided and requires its determination. Only a few methods are available in the literature for the determination of substituted anilines (5).

The facts that only a limited studies on the periodate oxidation of aromatic amines have so far been made and that DMA undergoes non-Malapradian periodate oxidation (6-9), have been made the basis for microgram determination of DMA in water in the present paper. The proposed method involves the spectrophotometric study of the periodate oxidation of DMA in water in presence of acetone which has been used for keeping the products in solution state under the conditions of the experiment.

EXPERIMENTAL PART

Materials and Methods

All the Chemicals used were of BDH/E. Merck (AnalaR grade). Sodium meta periodate (M and B AnalaR grade) was used after recrystallisation. For preparation of the samples for plotting the caliberation curves, DMA was used after Zinc dust distillation. Doubly distilled water was used for the preparation of solutions and to make up the reaction mixtures. Baush and Lomb spectronic-20 spectrophotometer was used for recording the absorbances. Micro pipettes were used for preparation of different solutions of DMA. pH measurements were made on Elico-pH meter.

Procedure

Stock solutions of DMA in acetone and 0.02 M sodium meta periodate in distilled water, were prepared. Reaction was started by adding the periodate solution clamped in a thermostatic water bath placed at 40±0.1°C into another vessel (also clamped in the same thermostatic bath) containing DMA in water-acetone medium. The reaction mixture was stirred well by the pipette itself. The reactants were mixed in such concentration proportions that acetone concentration of 1.25 per cent (V/V) and the periodate concentration of 0.01 M was maintained in the total reaction mixture.

The aliquots were removed after 10 minutes of starting the reaction and absorbance recorded within 8 seconds of withdrawl of aliquots.

RESULTS AND DISCUSSION

Absorption Maxima

$\lambda_{max.}$, as recorded on different intervals of time, was found to be 560 nm for the reaction mixtures under the conditions of the experiment mentioned above. This value differs widely from the absorption maxima of the reactants. It was observed that $\lambda_{max.}$ remains unchanged during the period of study. (Figure-1)

Caliberation Curves

Absorbances were plotted against the concentrations of DMA taken in micrograms in different runs. The caliberation curve has been found to be a straight line with correlation coefficient of 0.96.

Beer's Law and Reproducibility of the Results

Beer's law was observed to follow in the concentration range of DMA 30μg ml^{-1} to 121 μg ml^{-1}. Results were found to be reproducible and the maximum deviation noted was ± 3 per cent. The results of the recovery tests are shown in the Table-1.

TABLE-1

Microgram Determination of N-N-dimethylaniline

Concentration in μg ml^{-1}	Mean recovery in μg ml^{-1}
35.0	35.30
50.0	50.20
75.0	75.00
100.0	100.00
121.0	121.00

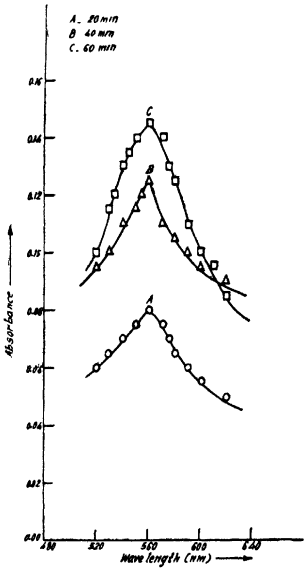

Fig. 1—Determination of absorption maxima at different times for the oxidation of N-N-dimethylaniline in acetone-water medium

Effect of pH

It was observed that the rate of the reaction under consideration (as given by the rate of development of color in the reaction mixture) remains constant in the pH range '6.1 to 7.1'. This observation follows from the initial rate –pH profile obtained by plotting the initial rates against the pH of the reaction mixtures. The initial rates values, in terms of $(dA/dT)_i$ (where A is the absorbance) were evaluated by plane mirror method (10) from the plot 'A' against the time 't'. For this study, the pH of the mixtures was maintained by using the 'THIEL, SCHULZ and COCH' (11) buffer.

So the proposed method applies only to the cases wherein the pH of the reaction mixtures lies in the range 6.1 to 7.1.

Effect of the Interferrants

Effect of the interferrants like aniline, p-chloroaniline, p-toluidine, o-methoxyaniline, p-methoxyaniline, p-ethoxyaniline, m-chloroaniline, m-nitroaniline, m-toluidine, m-methoxyaniline, and m-ethoxyaniline was studied. It was found that these interferrants do not interfere in the determination of the DMA by present method, when present in their maximum possible concentration range in water under similar conditions.

Product Analysis and the Mechanism of the Reaction Involved

The products of the periodate oxidation of DMA under the prescribed conditions of the proposed method were isolated and characterised as p-nitrosoanisole and O-methylquinoneoxime, by using the thin layer chromatography, Column chromatography, UV–VIS, IR spectral techniques etc

On the basis of the product analysis and other studies (7-9), the mechanism, as given in the Chart-1, is proposed.

In the mechanism proposed in the Chart-1, $[H_4IO_6]^-$ has been assumed as the oxidizing species in the light of the evidence put forth by Pavolva et al (12), because the present studies were carried out in the pH range 6.1 to 7.1. In the first stage a bimolecular reaction by a reversible process to form a complex (I) has been assumed which is

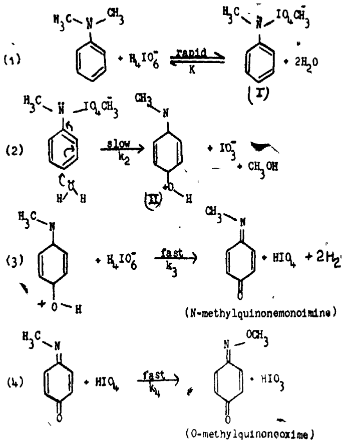

CHART-I

then attacked by water in a slow process to give an intermediate marked (II) which then gets oxidized by a fast process to form N-methylquinonemonoimine which finally gives O-methylquinoneoxime on oxidation.

The product O-methylquinoneoxime then tautomerises to give p-nitrosoanisole. The product isolated has been shown to be a mixture of these two products. It may be remarked that the formation of a periodate complex by a reversible process in the first step has also been assumed in the case of oxidation of catechol by Kaiser and

Weidman [13, 14], and the existence of complex has been experimentally demonstrated by them by employing the stopped-flow technique.

ACKNOWLEDGEMENT

The financial assistance to Dr. R.D. Kaushik, from University Grants Commission, New Delhi, for undertaking this work is gratefully acknowledged.

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The Chemical Analysis Of Ganga Water At Various Places

(Contributed to National Seminar on Ganga Pollution, G.K. University Hardwar (1985)

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ABSTRACT

A general survey of various places from Kanpur to Varanasi along with Ganga river was done. For every three miles six samples of volume 500 ml of Ganga water were collected and mixed. From the collection, only 1000 ml was preserved for test[1] In the duration of survey the physical properties of water, i e., colour, odour, transparentness and the medium of causing the pollution etc. were noted at the spot. In the chemical tests—the salt percentage, oily nature, acidity, basisity, measurement of degree of hardness and the approximation method of determination of biochemical demand of oxygen (B.O.D.) value and Facial Coliform Vacteria were done. The main harmful compound of mercury (Hg), Lead (Pb), Arsenic (As), Ammonia, Cromium (Cr), Calcium (Ca), Iron (Fe), Carbon (C), Copper (Cu), Cadimium (Cd) and Phosphorous (P) and Cobalt (Co) were confirmed in the sample water The excessness of nitrate (NO_3^-) and phosphorous were found in the sewage water as well as chloride (Cl^-) and sulphate (SO_4^{--}) were confirmed in the detergent mixed sample water.

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The serial of increasing the pollution percentage is Allahabad, Varanasi, and Kanpur. The determination of pH value of samples water shows a major difference from the normal value prescribed by WHO (World Health Organisation).

INTRODUCTION

The water pollution is a burning question before us. The symbol of Indian culture and civilization lies in Ganga, which becomes most polluted river in India. In the time of March to June it carries a number of components of harmful compound. In the same reference a survey and the collection of Ganga water sample was taken from Kanpur to Varanasi. The chemical analysis of Ganga water shows that this river has become very polluted and the use of its water is very harmful for the health[5].

The Method of Sampling

The famous places near the bank of river Ganga were selected for taking the sample of water. The survey and sampling was started from Kanpur to Varanasi. The other places were Dalmau, Kala Kankar, Kare Manikpur, Sringverpur, Rasulabad, Allahabad (Sangam), Vindhyachal, Mirzapur and Varanasi.

In the process of sampling the distance of 3 miles was chosen For every half a mile the volume of 500 ml of water was collected and mixed altogether[6]. From this collection of sample water, 1000 ml was preserved for test. On the spot the colour, odour, transparentness, temperature and sources of causing the pollution were also noted. Every possible precautions were taken in the collection of the sample water.

Method of Study

All the chemicals used were Ar grade. The instruments used were in the limit of prescribed accuracy. The chemical analysis of Ganga water was done in the two sections

1 Qualitative analysis

2 Quantitative analysis

In the qualitative analysis we adopted the usual semi-micro system In some cases the spot test was also used. For example, the presence of tertiary amine in the polluted water can be confirmed by the following test :

1. ter (amine) from Ganga water + citric acid $\xrightarrow[\text{Acetic Anhydride}]{\Delta}$ →

→red colour appearance shows the presence of ter NH_2.

Spot Test[7]

The wet filter paper of 2% aq. citric acid was dried. A drop of sample water was added. The above paper was heated upto 170°C and after adding 1, 2 drops of acetic anhydride, the appearance of red colour has shown the presence of ter NH_2 The % of N can be calculated from micro chemical test also.

Chloroform Test for Positive and Negative Ions

20 ml of sample water + 2 ml of 0.1 N-NaOH (aq) + 3 ml of $CHCl_3$ ⟶(mixture was shaken)⟶the polluted material will go to chloroform layers[5].

All the tests were performed according to the standard methods.

Results and Discussions[1]

The physical and chemical test of Ganga water gives the informations that—

1—The Ganga is more polluted in Kanpur, Varanasi and Allahabad in comparison to the places mentioned above. The quantitative analysis shows the higher percentage of Chloride, Nitrate, Copper, Mg, Cd, Hg, Pb, Ca and SO_4^{--} than the normal value prescribed by WHO (Table 3).

2—The higher percentage of Chloride, Sulphate, Lead, Mercury, Cadimium and Cromium in the Ganga water produces Cancer, Charmrog and Dyenia[1]. The higher percentage of mercury in the water causes bone disease[2]

3. The presence of organic substances are harmful for fishes. They cannot produce eggs in the excess presence of the above substances.

4. The people living near Assi Ghat in Varanasi are using Gatter Water for drinking The Chloride content in it is approximately 14 %.

5. The excess presence of Lead, Cadmium and Mercury in water is harmful for kidney and stomach as well as Pan creas[5].

6. The polluted water creates the problem for N_2 fixation and therefore harmful for agriculture[4].

7. At high temperature the Oxygen content decrease in water. While at 5°C temperature and 760 cm of Mercury pressure, the normal

value of Oxygen content is 8·908 ml / per litre. In Varanasi the temperature goes upto 30°C to 50°C due to the continuous burning of dead bodies and hence the oxygen content decreases.

8. The amount of salt which is not harmful for health is 0.9 mg to 1.18 gr/litre. But the actual value is more in Ganga water. We can say that Ganga water is not suitable for health (6, 7).

9. The burning example of Ganga pollution can be seen at near the Ghazipur where the waste materials of Opium Industry is thrown directly in the rivers. The monkeys of that area has become mad due to the continuous drinking of Ganga water.

TABLE–I

Chemical components of water pollution at various places

Name of places	Salt %	$[H^+]$	Oily nature %	Total harmful comp. %	Colour	Hardness of water with respect to 60°	Temp.
Kanpur	6·5	6 8	3·0	17·6	Blackish green	Hard	20°C–40°C
Dalmau	4·5	6·9	1·5	2·6	Soily.	less soft	25°C
Kalakankar	2·1	6·9	1·1	3·5	Soily	less soft	28°C
Kare Manik-pur	2·8	6·9	1·6	2·5	Soily	less soft	26°C
Sringverpur	2·8	6·9	1·0	2·4	Soily	less soft	25°C
Rasulabad	2·6	7·8	0·2	3·0	Soily Green	soft	32°C
Allahabad	2·5	8·46	0·2	3·8	Sitasit Green	soft	35°C
Vindhyachal	1·8	8 23	0·05	2·4	Soily Green	soft	30°C
Mirzapur	3·2	8·20	2·5	2·6	Black Green	soft	31°C
Varanasi	4·0	8·58	4 5	5·6	Brownish Black	Hard	30°C–50°C

TABLE NO. 2

	W. H. O. Standard in Mg / litre	National Nagar Nigam Standard in P.P.M.
Chloride	200—600	250
Copper	1 — 1·5	1–3
Zinc	5 —15	15
Magnesium	50–150	125
Calcium	75–200	7·5 – 1·5
Cloride	1 — 1·5	1·2
Sulphate	20–400	225
Nitrate	–	45
Cromium	–	0 05

TABLE–3

Chemical components of water pollution of various places (in gram per litre)[3]

	Kanpur	Dalmau	Kala Kankar	Kare Manikpur	Sringverpur	Rasulabad	Alld.	Vindnyachal	Mirzapur	Varanasi
$\overset{+2}{\text{Ca}}$	1·4	0·6	0·2	0·3	·15	0·1	0·9	0·4	0 46	0·92
$\overset{-}{\text{Cl}}$	1·8	0·9	0·6	0·5	0·5	0·54	1·1	0 86	1·2	1·4
$\overset{-}{\text{NO}_3}$	1·4	0·4	0·3	0·3	0·2	0·4	0·9	0·5	0 8	0·78
$\overset{+2}{\text{Cu}}$	1·2	0·4	0·3	0·2	0·2	0·3	0 8	0·6	0 5	0·8
$\overset{+2}{\text{Zn}}$	0·4	0·2	0·6	0·5	0·4	0·4	0·9	0·5	0·4	1·2
$\overset{+2}{\text{Mg}}$	1·6	0·3	0·5	0·4	0·4	0·6	0 6	0·9	0 6	1·3
$\overset{+2}{\text{Cd}}$	0·8	0·2	0·1	—	—	—	0·5	0·2	0·4	0·9
$\overset{-}{\text{F}}$	1·8	0·8	0·6	0·4	0·4	0·6	1·2	0 7	0 9	1·3
$\overset{--}{\text{SO}_4}$	2·4	0·6	0·8	0·6	0·45	0·6	1·2	1·2	1 4	1·8
$\overset{+2}{\text{Pb}}$	3·0	2·0	0·8	0·6	0·4	0·6	0 9	0·9	0 6	0 9
$\overset{+2}{\text{Hg}}$	1·2	0·2	0·1	—	—	0 4	0 6	0·3	0 4	0·92
$\overset{+3}{\text{Cr}}$	0·8	0·3	0·2	0·18	0·06	0·3	0·4	0·3	0·4	0·52
$\overline{\text{PO}_4}$	1·3	0·6	0·5	0·3	0·2	0·1	0·15	0·8	0·4	0·14

*Comparable study can be done with the Table No. 2

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Ganga—The Cradle of Cities

Great cities of the world have often been built on the banks of great rivers. So it has been with the Ganga.

Settlements and civilisations came early upon the river. From Taxila and Pushkalavati through Indraprastha, Mathura, Kausambi, Prayag and Patliputra down to Tamralipta, a string of cities stretched along the Ganga and its tributaries. These Ganga towns were the hub of the ancient Aryan Kingdoms founded before 509 BC.

The fame of many of these cities had spread far and wide from the very beginning. Patliputra, in particular, is even today linked with the memory of Ashoka and Vikramaditya. Later Kannauj rose to prominence with the rise of Harshavardhana.

400 years after Harshavardhana, Mahmud of Ghazni extended his domain right upto Lahore. But the eastern kingdoms and their capital cities remained free till the time when the region was absorbed under the Sultanate of Delhi.

But even as political fortunes fluctuated and one dynasty replaced another, the Ganga towns continued to be great centres of trade and commerce, craft and culture.

The Khiljis, the Lodhis and the great Mughals added their imprint. Aga, Allahabad, Mirzapur, Jaunpur, Rajmahal, Gaur and Murshidabad became new additions to the Gangetic urban scene.

The mendicant, the merchant, the prince, the preceptor and the conqueror have all been drawn to Ganga over the ages. And so it was, when the Danes, the Dutch, the French and the British coveted the riches of the east, they sailed up the Ganga and the Hugly. Towns on the Ganga like Sarampur, Chandernagar and Calcutta then became the new land-marks.

As politics and trade got mixed, the fortunes of the cities changed. Azimganj, Sahabganj, Sultanganj and other trading posts expanded and became cities. The needs of the military gave rise to new settlements. Steam navigation brought riches to Mirzapur. One of the earliest railway lines originating at Calcutta ensured Kanpur's rise as an industrial town.

from 'THE GANGA ACTION PLAN'

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Spectrophotometric Determination Of Aniline In Microgram Amounts In Water

(Contributed to National Seminar on Ganga Pollution, G.K. University Hardwar (1985)

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INTRODUCTION

Aniline is one of the chemicals the exposure of which causes skin eruption, nervousness, dimness of vision, weakness, nausea and cyanosis etc (1). On the other hand, if the presence of aniline in water is identified and it is determined, separated and recycled, it finds great use in the chemical industries manufacturing the dyes, resins, explosives etc. It is also employad as a solvent and in the manufacture of some other chemicals (1).

The chances of presence of aniline in the water containing chemical industry effluents can not be ruled out (7). Present paper deals with our findings related to the microgram determination of aniline in water by using the spectrophotometric technique. The proposed method is quick and involves lesser complications than the other reported methods (5–8), apart from the good accuracy and the precision involved. Out of the various oxidants employed for the oxidation of aromatic amines, the periodate oxidations have received a little attention so far (2–4). So, in the present method, the periodate has been used as oxidant for the oxidation of aniline in water medium.

**The author to whom the correspondence should be made.*

EXPERIMENTAL PART

Materials and Methods

All the chemicals used were of AnalaR grade. Sodium meta periodate of M and B AnalaR grade was used after recrystallisation. Aniline was used after redistillation in presence of zinc dust, for the preparation of the standard samples. Doubly distilled water was used for the preparation of solutions and the reaction mixtures. B and L spectronic 20 spectrophotometer was employed for recording the absorbances Absorption maximas at different intervals of time were recorded on Carl-Zeiss automatic recording spectrophotometer.

Procedure

Stock solutions of 1 per cent aniline and 0.02 M sodium meta periodate were prepared in distilled water. Reaction vessels containing different concentrations of aniline, were clamped in a thermostatic water bath placed at 35 0±0.1 °C Periodate solution was also clamped in the same bath in a separate vessel. After 5 minutes the periodate solutions were added to the aniline solutions and the mixtures stirred sharply with the pipette itself Aliquots were removed from the reaction mixtures after 30 minutes of the start of reaction. The absorbances were recorded immediately on the spectrophotometer, within 8 seconds of withdrawing the aliquots For all the runs, the periodate concentration was kept fixed at 5×10^{-4} M in total reaction mixture.

RESULT AND DISCUSSION

Absorption Maxima

λ_{max} for the reaction mixture was found to be 355 nm under the conditions of the experiment. Absorption maxima for aniline and sodium meta periodate differ widely from this value. It was found that the λ_{max} for the reaction mixture remains unchanged during the period in which the studies were made. (Figure-1.)

Caliberation Curves :

To get the caliberation curves, the absorbances were plotted against the concentrations of aniline taken in micrograms. The caliber-

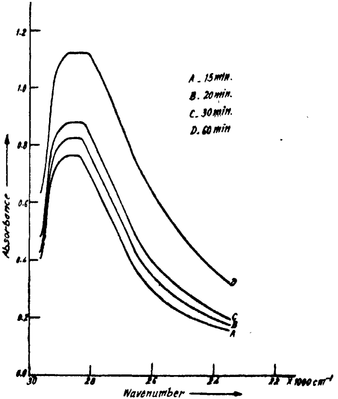

Fig 1–Determination of absorption maxima at different interval of time for the oxidation of aniline in –water medium.

ation curve was found to be a straight line with good correlation, the correlation coefficient being 0.98.

Beer's Law and Reproducibility of the Results

Beer's law was found to be obeyed in the concentration range 50μg to 810 μg ml^{-1}. Results were found to be reproducible and the maximum deviation noted was ± 1 per cent. The results of recovery tests are shown in the Table -1-.

TABLE-1

Determination of Aniline in Water

Concentration in $\mu g\ ml^{-1}$	Mean recovery in $\mu g\ ml^{-1}$
50.0	50.0
100.0	100.25
410.0	410.00
600.0	600.00
800.0	800.50

Effect of the Interferrants

Effect of the interferrants like N-N-dimethylaniline, p-chloroaniline, p-toluidine, o-methoxyaniline, p-methoxyaniline, p-ethoxyaniline, m-chloroaniline, m-nitroaniline, m-toluidine, m-methoxyaniline and m-ethoxyaniline was studied. It was found that these interferrants do not interfere in the determination of the aniline by present method, when present in their maximum possible concentration range likely to be present in water.

Product Analysis and Mechanism of the Reaction Involved

The products of periodate oxidation of aniline under the prescribed conditions of the method, were isolated and separated by using thin layer chromatography. Two of the products were characterized as 2, 5-dianilino, p-benzoquinoneimine with melting point 245°C (decomp.) and 2-amino, 5-anilino. N-phenyl -p-benzoquinoneimine with melting point 117°C. UV-VIS, and IR spectral studies supported the structures of these reaction products.

On the basis of the product analysis and other studies, (3, 4) following mechanism is proposed for this oxidation reaction (Chart-I).

In the mechanism proposed in the chart-I, $[H_4IO_6]^-$ has been assumed as the oxidizing species in the light of the evidence put forth by Pavolva et al (11), wherein it has been shown that the various forms of periodate, $[H_4IO_6]^-$ is having maximum concentration in the pH

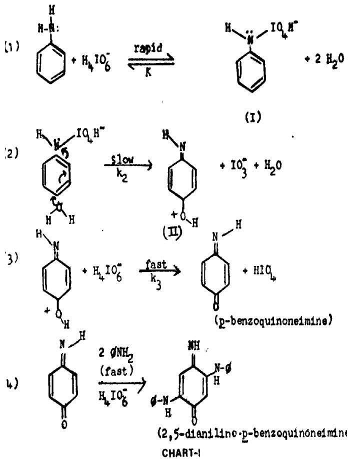

CHART-I

range 3.5 - 7.5. The present study has been carried out at the pH of 7.0 In the first stage a bimolecular reaction by a reversible process to form a complex (I) has been assumed which is then attacked by water in a slow process in the second stage to give an intermediate marked (II) which then gets oxidized by a fast process to form p-benzoquinoneimine, which, in turn, undergoes oxidative condensation with two molecules of aniline to form 2,5 -dianilino -p-benzoquinoneimine which has been characterized as the major product of the reaction under consideration.

It may be remarked that the formation of a periodate complex by a reversible process in the first step has also been assumed in the case of oxidation of catechol by Kaiser and Weidman (9-10), and the existence of complex has been experimentally demonstrated by them by employing stopped flow technique.

p-benzoquinoneimine formed in the step-3 might be also undergoing condensation with aniline by an alternative route to form 2-amino, 5-anilino, N-phenyl, p-benzoquinoneimine which has also been isolated and identified by us. However the exact mode of this condensation reaction could not be worked out

ACKNOWLEDGEMENT

One of the authors (RDK) is thankful to University Grants Commission for providing financial assistance to carry out present work.

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The Biological Spectrum Of Vyasi-Valley Flora--District Tehri Garhwal

(Contributed to National Seminar on Ganga Pollution, G.K. University Hardwar (1985)

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INTRODUCTION

The general appearance of a plant communit is caused more by Life-Form of the dominant plants than by any other characteristic of the vegetation (Hanson & Churchill, 1961). But it could be also due to growth form, which is more so in tropical countries, where biotic factors are dominant. The Life-Form system of Raunkiaer (1934) on a physiognomic basis (dealing also with the normal spectrum) can best be applied to describe the vegetation. An attempt has been made here to study the Life-Forms of the flora of Vyasi-valley, District Tehri Garhwal and draw its biological spectrum to find out how far it tallies with the normal spectrum.

Area of Study :

VYASI, a small village, is stuated on the way to Badrinath in the South-Eastern corner of district Tehri Garhwal. It is situated in thick 'Sal' forests in a narrow valley on the right bank of river Ganges at an altitude of 455 M , above the sea level, between 30°20'—30°50' N and 78°35'—79°55' E. The area receives more than 2100 mm. rainfall annually.

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Vegetation :

The vegetation of Vyasi and its viscinity consist of chiefly thick Sal forests, which according to Champion and Seth (1968) is sub-group 3C—North Indian Tropical Moist Deciduous forest. However, this forest differs from the typical which has been described in having *Olea glandulifera* Wall., and *Madhuca indica* Gmel., as the common associates. This type of combination has not been described. *Olea glandulifera* Wall. is a Himalayan plant while Sal and *Madhuca indica* Gmel , are both tropical plants, usually found in the plains. The presence of Himalayan and plain elements together appears to be the unique feature of this forest

On dry hill slopes with shallow soil, the 'Sal' is completely absent, and the forest consists of few small trees distantly placed The ground is covered by various types of grasses.

Biotic Factors :

The vegetation of the area is influenced by biotic interferences such as agriculture and grazing. The area is visited every year by nomads (locally named "Paharees/Gujjar) with their large number of livestocks (buffaloes, cows, goats etc) They stay in 'SAL' forest for long periods and trample, graze and sometimes burn it, thus damaging the young seedlings and new growth.

Observations :

The present study was undertaken during the years 1975-77. The floristic composition was studied, the area was fully explored, plants were enumerated and identified. The climate of the region is suitable for forest development and phanerophytes must be dominant. But the study revealed the dominance of Therophytes (as weeds and crops) due to agricultural practices and other biotic interferences, (grazing, burning, scraping etc.), which have altered the biological spectrum of the area. The investigated flora yielded a total number of 416 species of angiosperms which are divided into various Life-Form classes in accordance with Life-Form system of Raunkiear (1934). The ephemerals and other herbs under Therophytes are more dominant and have highest percentage. (Table-1).

Discussion :

The results of the present investigation are not in confirmation to the normal Life-Forms spectrum A comparison of the biological spectrum of different regions of India (Table-1) shows that Vyasi-valley simulates the phytoclimate of Therophytic nature of Allahabad (Srivastava, 1944) and Karamnase Watershed (Rao, 1968). The highest percentage of therophytes has also been reported in the works of Siddiqui (1972), Dhyani (1982) and Rajwar (1984) The dominance of therophyte class does not support the normal biological spectrum's hypothesis, but agrees with the statement of Beadle (1951) that, "climate can not always be taken as an indicator of vegetation of a place." In this case it is not safe to designate the plant-climate of the area as Therophytic, as the figures of the biological spectrum relate to the flora and not to the bulk of the species growing in the area Therefore, the dominance of one Life-Form over the other has a very limited meaning Further, the biological spectrum indicates the most operative factor of the environment and not the climate.

In the present case the biological spectrum may be taken as a rough guide to the degree of biotic exploitation and not as indicator of plant climate.

Thus it is evident that Vyasi-Valley favours the luxuriant growth of Phanerophytes provided the biotic exploitation does not influence it

Summary :

The Life-Form spectra of Vyasi Valley Flora (District Tehri Garhwal) has been compared with the normal biological spectrum and other climatic types in India. The study reveals the dominance of therophytes due to biotic exploitation, though the valley favours the luxuriant growth of Phanerophytes.

TABLE-I

Phytoclimatic Spectrum of Vyasi-Valley Flora And Other Climatic Types in India Compared With The Normal Spectrum :

REGION	PERCENTAGE DISTRIBUTION OF LIFE-FORMS*				
	Th	G	H	Ch.	Ph.
World or normal spectrum (Raunkier, 1934)	13	6	26	9	46
Allahabad (Srivastava, 1944)	41.6	7 8	3.4	9.2	38.0
Karamnasa Watershed (Rao, 1968)	43	10	1	6	40
Gorakhpur Forest (Siddiqui, 1972)	32.6	7.0	7.4	4,4	0.4
Dehra Dun Flora (Dhyani, 1982)	43,05	6.5	2 96	12.35	35.18
Garhwal Siwalik (Rajwar, 1984)	62 8	4.5	0.2	6.7	26.8
Vyasi-Valley (Present Study)	49.1	5.8	4.3	9.8	31.0

* TH – THEROPHYTES G – GEOPHYTES
H – HEMICRYPTOPHYTES
Ch – CHAMAEPHYTES
Ph – PHANEROPHYTES

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Fish Facing Menace From Pollution

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The river Ganga originating from Gomukh at a height of 4,000 m covers a distance of about 2525 Km before meeting the Bay of Bengal. The river is famous for its rich source of a variety of fishes. But it is quite deplorable that so far proper attention has not been paid to the preservation of fishes. The water is being polluted daily by inflow of heavy organic loads in the form of debris altering the quality of water and making a home for a number of species of bacteria. Among these, certain bacteria are responsible for bacterial diseases causing heavy mortality in fishes.

The internal organs except the intestine of healthy fishes contain no bacteria. But, if bacteria are found in the skin, muscles, liver, heart, ovary and kidney, these may be the cause of disease. Generally the bacteria gain their entrance into the body through the small wounds on the body or gills or through the eroded walls of the digestive tract. The majority of pathogenic bacteria are Gram negative while some are Gram positive. Let us be acquainted with important bacterial diseases.

Furunculosis disease affects mainly the various species of salmon and trout fishes. It is caused by a non-motile rod-like Gram-negative bacteria *Aeromonas salmonicida*. The disease is characterized by the presence of open sores on the body. It is essentially a generalized septicemia with or without the characteristic furuncles, the bacteria destroy the walls of blood vessels and spread out into the surrounding tissues. The lesions, thus formed, appear as minute red spots in the subcutaneous tissue or among muscle fibres, filled with a deep-red, pus like material composed of bacteria, blood and broken muscle fibres. Sometimes, soft blister-like lesions filled almost entirely with blood are formed just beneath the skin. In the later stages, infection can also be seen in gills, liver, spleen and kidney. The intestinal lining becomes inflamed In small fingerlings an irregular dark blotch between the dorsal and pelvic fins is the most characteristic symptom of the disease

Ulcer disease is caused by a non-motile, rod-like Gram-negative bacteria *Haemophilus piscium* infecting different species of salmon and trout fishes. The disease is characterized by the formation of open sores or ulcers on the surface of the body, superficially resembling furunculosis. The lesion appears as a small outgrowth of the epidermis, which later becomes wrinkled and very irregular in shape, extending to a length of several millimeters to centimeters. Ulcers develop rapidly in the jaws and roof of the mouth, and may result in the entire eating of the bones. The dorsal and caudal fins are also attacked. The fin rays are destroyed and eventually fall out. In contrast to furunculosis, lesions of ulcer disease remain confined to dermis and do not extend into muscles The blood, liver, kidney and spleen fail to show any evidence of such bacteria.

Columnaris disease affects various species of fishes like buffalo-fishes, crappies, black basses, the cat-fishes and sun-fishes It is caused by a motile Gram-negative bacillus, *Flexibacter columnaris.* The bacteria move into columns or streaks which give the disease its specific name. The lesions may be yellow or orange coloured and can be seen usually on the skin of head, back and gills The other parts of the body may also be involved. The lesions are often more necrotic on the gills and death occurs more rapidly They develop into haemorrnagic ulcers on the skin

The peduncle or coldwater disease is caused by other species of bacteria Gram-negative *Flexibacter psychrophila*. It affects the young salmon fishes at relatively low temperature. The bacteria attack epidermis of the adipose fin and multiply rapidly in the epidermis underneath. The bacteria then invade the muscles usually preceded by congestion of blood vessels. In later stages bacteria can also be seen in heart and kidney

The bacterial gill disease of salmonids is caused by species of motile, slender bacilli, Gram-negative *Cytophaga* bacteria. The fish becomes sluggish and loses apetite. It suddenly stops taking food. The gills are swollen, congested and consequently appear deeper red. Eventually, the gills may become badly fungused, the fungus often spreading from the gills to the top and sides of the head. There is an increased secretion of mucous by the gills accompanied by thickening and fusion of gill filaments. The debris becomes entangled in the mucous clogging the gills, thus interferring the free exchange of gases. This results in respiratory distress.

The salmonids may also be affected by straight or curved rode-like Gram-negative bacteria *Pseudomonas fluorescens*. It causes haemorrhagic bacterial septicaemia, clinically indistinguishable from furunculosis septicaemias. It is characterized by large haemorrhagic skin lesions resulting in heavy mortality very shortly. It causes hyperaemia of dermal vessels with severe oedema extending into the lower epidermis. The ulceration follows quickly and lesions are extended down into the underlying muscles. The infection also spreads to spleen and kidney

The motile, rod-like Gram negative bacteria affects rainbow trouts causing severe congestion and deepseated haemorrhage of the tissues of the head. There may be erosion, especially of the lower jaw, resulting in a red haemorrhage of peritoneal surface and necrosis of the intestinal mucosa. The other rod-shaped motile bacteria *Aeromonas hydrophila* is also usually associated with haemorrhagic septicaemia of fishes. The clinical symptoms are similar to those of psuedomonad septicaemia. The organism has been associated with secondary infection of cyprinids suffering from infection with *Rhabdovirus carpio* and with spawning mortality in salmonids.

Virbiosis disease has also been recorded in freshwater fishes associated with feeding of marine fish offals. It is caused by a motile Gram-negative curved rod, *Vibrio anguillarum*. The disease often causes anoxeria, darkening of the skin and sudden death. Periorbital and/or abdominal dropsy may also develop. Acutely affected fish show swollen, dark skin lesions which ulcerate to release blood-coloured exudate. The ulcers may be very deep and necrotic. There is an enlargement and liquiefaction of tne spleen and kindney. Focal haemorrhages may also be seen on the surface of the heart. The gills become usually paler.

There are some Gram-positive bacteria also which are the cause of mortality in fishes. The spherical or ovoid shape *Streptococcus faecalis* affecting mainly salmonids has been associated with myopathy and generalized septicaemia. The rod like *Clostridium botulinum* may affect trout fishes. The disease is characterized by nervous imbalance, with affected fish swimming up and down in water and twitching. Cornybacterial kidney disease is caused by small diptheroid bacilli *Cornybacterium* sp. affecting salmonid fishes. The affected fishes are usually darker in colour with occasionally exophthalmos and small haemorrhages at the bases of pectoral fins. Small raised vesicles may also be found on the sides of the fish. At necropsy, lesions are usually found in the kidney. These lesions are whitish miliary or nodular granulomate and may have a red hyperaemic rim.

The bacterial diseases are usually associated with unhygeinic conditions, poor water quality and alteration of water temperature. A number of antibiotic and sulphonamide drugs are being used to eradicate the bacterial infection. But these are temporary measures The long term treatment lies in improving environmental conditions, especially increased oxygen, control of water temperature and of organic pollutants to the water Besides this, prevention of contamination of water by infected fishes and maintenance of strict hygienic conditions are needed By doing so life of thousands of fishes can be saved.

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Fodder Plants Of Garhwal-Himalayas

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INTRODUCTION

The Garhwal Himalayas covers an area of 30,090 sq. km in 77°35′-80°6′ E longitude and 28°21′-31°28′ N latitude and situated in the north-western part of Uttar Pradesh. This region is gifted with different agro-climatic conditions The temperature ranges from 29·4° to 40 0° C and goes below freezing point during winter months Normally the rainy seasons commences from the second week of June and lasts till end of September. The average rainfall of the area is 1,525 mm. The terrain of this area is abrupt and has steep to gentle slopes. There are many flat valleys where the climate is warmer as in the plains.

The Garhwal Himalayas consists of five districts, viz., Pauri, Chamoli, Tehri, Uttarkashi and Dehra Dun.

The critical study of the meterological data and the elevation which extends from 1,000 m to 7,000 m in area clearly shows that this region has different climatic condition right from arctic to sub-tropical. Out of the total available area, 5·8% area is covered with snow, 73·2% area is under forests, pastúres and bare rocks. The area under agriculture and cultivable land is 11·6% and 9·4% respectively.

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The majority of the population of this region is engaged in cultivation. Cultivation in hills is a strenuous and unprofitable occupation, which engages a lot of man power and yield little out put

Apart from the cultivation, the rural population of these areas have to work hard to get fuelwood and forage for the large bovine population. This is the most arduous task and most time consuming work which is done by the females of the family For this they have to travel miles together. Due to large scale deforestation in hilly areas the fodder resources are under great pressure. Thus the need of a sustained system of fodder production from the available resources by integration of planting fast growing multi purpose shrubs, small trees capable of coppicing or pollarding and adaptable to varying agro-climatic situations.

The Garhwal Himalayas support a large number of bovine population which is much over their carrying capacity. The grazing incidents for hills districts of Uttar Pradesh works out at 0·2 ha / unit whereas the barest minimum required is 0·5 ha / unit. The existing grasslands are in a poor state and need immediate attention (Gupta, 1979). The problem of forage is more acute during summer months and in high mountain areas.

Fortunately, there are a number of tree or shrub species found in these region which are exploited for obtaining fodder. Many of them are very nutritive and increase the milk yield also. A list of the fodder species with their botanical and vernacular name and a short description of usage as fodder is being given which are of common occurence in Garhwal Himalayas.

MATERIAL :

Sl. No.	Botanical Name	Local or Vernacular Name	Use
(1)	(2)	(3)	(4)
1.	Acer accuminatum	Kainjli, Kanjila, Kamia.	The leaves of all the four species are lopped for fodder during winter.
2.	A. caesium	Bara Kainju	
3.	A. ablongum	Pangoi, Kirmda	
4.	A. villosum	Kainju, Mandarka	
5.	Aechmanthera tomentosa	Bharada	It is considered to be a good fodder for sheep and goats.
6.	Aesculus indica	Pangur, Kandur	The leaves are good fodder for sheep in winter. Fruit is also given to cattle and goats.
7.	Albizzia-stipulate	Kaunsra, Siran	The branches are lopped for fodder.
8.	Alnue nepalensis	Puzala, Kunis	Leaves are used as fodder for all livestocks during winter.
9.	Arundineria falconeri	Deo-ringal	Leaves are lopped for fodder of these three species.
10	A. falcata	Go-Ningal, Ringal	
11.	A. spathiflora	Ringal	
12.	Asparagus adscendens	Jhirna, Hazar-muli	Both plants are brawsed by sheep and goats.
13.	A. curillus	Jhirna	
14.	Azadirachta indica	Nim	Leaves are much lopped for goat.
15.	Bahunia purpurea	Guiral	All the bahunias are lopped for feeding domestic cattles.
16.	B. vahlii	Malo	
17	B variegata	Kachnar	
18.	Berberis asiatica	Kingora	Both the species are browsed by sheep and goats.
19	B. petolaris	Chatrod, Kingora	
20.	Betula alnoides	Kath-bhuj	The leaves are lopped for cattle fodder.

(1)	(2)	(3)	(4)
21.	B. utilis	Bhoj-patra	
22.	Bachmeria platyphylla	Khaksha	Leaves are good for cattle fodder.
23.	Bombax ceiba	Semal, simla	The flowers are very much liked by cattles, and the seeds are also given.
24.	Bridelia retusa	Gaya, Khaja	Leaves used as cattle fodder.
25.	Buddleia paniculata	Phurpattia	Good fodder from July to November.
26	Butoa frondosa	Dhak, palas	Leaves used as buffalo-fodder.
27	Cajanus indicus	Tor	Leaves are food fodder.
28.	Canssa opaea	Karaunda	Leaves are liked by goats and sheep.
29.	Cassia fistula	Amaltas, sinara	Twigs are often lopped for fodaer.
30.	Caltis australis	Kharik	Lopped during winter for feeding every class of livestock, but villagers believe that it reduces the milk yield.
31	Clematis nopalenaio	Kanjul	All livestock feed on it throughout the year.
32	Cordia obliqua	Lassera	Leaves lopped in winter for fodder.
33.	Coraria nepalenois	Masuri, Gangara	Branches are browsed by sheep and goats.
34.	Cornus macrophylla	Khaksha	Leaves are lopped for goat-fodder, fruit is eaten.
35.	Crataegus crenulata	Gingeru	It is browsed by goats and sheap in winter.

(1)	(2)	(3)	(4)
36.	Debregesia valutima	Tushara	It is fed to all cattles.
37.	Deeringia celosioides	Chundri	Young shoots and leaves are food fodder.
38.	Desmodium tilliaedolium	Matoi, Chomlai	The twigs are browsed by cattles.
39.	Ficus bengalensis	Bar, bargat	The leaves and twigs are eaten by cattles.
40.	F. cunia	Khain, Khaina	The leaves of these three species are good fodder.
41.	F. palmata	Bedu	
42.	F. roxburghii	Timla	
43.	F. rumphii	Pilkan	Leaves and branches lopped for cattle fodder.
44.	Grewia optiva	Bhimal	The leaves are very good fodder for cattles in milk.
45.	Hedera helix	Mithiari	Leaves are favourite fodder for sheep.
46.	Holbellia angustifolia	Gophal	The leaves are eaten by cattle.
47.	Ilex dipyrena	Kandela	In winter it is fed to animals.
48.	Indigofera atropurpuea	Kala sakina	All species of Sakina are browsed by animals and very much liked by them.
49.	I. hoterantha	Sakina	
50.	I. pulchella	Sakina	
51.	Jugalans regia	Akhor	The leaves are used for cattle fodder.
52.	Lannea grandis	Jhingam	Leaves are favourite for cattle.
53.	Lingustrum compactum	Kakurchha	Leaves are lopped for fodder.
54.	Litsaea umbrosa	Chirara	It is commonly browsed by animals.
55.	Lonicera quinquebocularis	Takroi badkukra	Cattles are fed on the leaves.
56.	Machilus odoratissima	Kaula	It is fed to sheep and goats.

(1)	(2)	(3)	(4)
57.	Marlea begyniaefolia	Garh kimu	It is fed to sheep and goats.
58.	Melia azedarach	Bakain, dek	Leaves are lopped for fodder.
59.	Milletia auriculata	Gaunj	—do—
60.	Mitragyna parivifolia	Phaldu	—do—
61.	Moringa pterygosporma	Sohjna	—do—
62.	Morus serrata	Kimu	—do—
63.	Olea cuspidata	Kau, Kahu	—do—
64.	Olea glandifera	Gair, gaild	—do—
65.	Ougenia delbergioides	Sandan	—do—
66.	Pistacia integerrima	Kakkar	Leaves are lopped for buffaloes.
67.	Populus ciliata	Pahari pipal, Tilaunju	Leaves are good fodder for goats.
68.	Prunus cerasoides	Padam	It is fed to all classes of livestocks.
69.	P cornuta	Jamoi	Leaves are lopped for fodder.
70.	Pyrus pashia	Mohal	—do—
71.	P. foliolosa	Ghiya	—do—
72.	Quercus dilatata	Moru	—do—
73.	Q. incana	Banj	Leaves are lopped for fodder, particularly in winter.
74.	Q. semeearpifolia	Kharsu	—do—
75.	Reinwardtia trigyna	Phiunli	It is grazed by all Livestocks.
76.	Rhamnus virgata	Chaurdha, Chedul	It is fed to all ruminants.
77.	Ribes glacialo	Darbia	It is browsed by sheep and goats.
78.	R. rubrum	Kimkuria	—do—
79.	Rosa macrophylla	Kunjo	—do—
80.	R. sericea	Dhurkunja	—do—
81.	Rubus ellepticus	Hinsar	It is browsed by sheep and goats.
82.	Rumex hastatus	Almor	—do—
83.	Saccharum spontancum	Kans	Fodder for buffaloes.

(1)	(2)	(3)	(4)
84.	Salix daphroides	Bashroi	Leaves used for cattle fodder oftenly given to sheep and goats.
85.	Salix elegans	Kadvi	
86	S. wallichiana	Bhinshra	—do—
87.	Sapindus mukorossi	Ritha	Leaves are used as fodder.
88.	Spiraea canescens	Takoi, Mairah	Leaves are grazed by ruminants in May–June.
89.	S. lindleyana	Latkar, Kathix	Browsed by sheep and goat in winter.
90.	Strobilanthes –atropurpureus	Titana	Both varieties are considered very nutritive for sheep and goats when the leaves are mature, but poisonous, when they are young and soft (May-. June)
91.	S. wellichii	Jan	
92.	Symplocea crayaagoides	Lodh	Leaves are lopped for fodder.
93.	Syringa emodi	Shephroi	Leaves are given as fodder to goats.
94.	Triumfetta pilosa	Kura	It is sometimes fed to ruminants.
95.	Ulmus wallichiana	Emrol	Leaves are very good fodder for cattles.
96.	Urtica parviflora	Kandali	It is eaten by buffaloes. Sometime the plant is dried in sun and then beaten up and fed to cattles. It is said to increase the milk yield.
97.	Viburnum cotinifolium	Bhutnoi, Ghenu	It is browsed by sheep and goats in winter.
98.	Vitis lanata	Bhinana	—do—

(1)	(2)	(3)	(4)
99.	V rugosa	Chipari	It is believed to increase milk lyield and is very nutritive fodder for all classes of livestocks.
100.	V semicordata	Laduli	—do—
101.	Woodfordia floribunda	Dhaula	It is browsed by all ruminants in winter.
102.	Zanthoxylum alatum	Timru	The plant is fed in winter to sheep, goats and drought animals.
103.	Zizyphus jujuba	Ber	Branches and leaves are lopped for fodder
104.	Puerania hirsuta	Kundzu	It has been found growing in some places, where it is used as a fodder for the cattles.

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National Seminar On "Conservation And Ethnobotanical Aspects Of Indegenous Medicinal Plants"

The medicinal plants and microbes were used in traditional health practices and folk remedies in the past and their utility for the society is still greater now. The plants and micro-organisms are the sources of several products of economic importance; with an aim to bring together research workers engaged in the research on medicinal aspects of plants and microbes, Gurukula Kangri Vishwavidyalaya, Hardwar, organised a national seminar on "CONSERVATION AND ETHNOBOTANICAL ASPECTS OF INDEGENOUS MEDICINAL PLANTS" on September 25-26, 1986, which was convened by Dr Purshotam Kaushik of Botany Dept. of G. K. V.

Dr Satyavrat Siddhantalankar, Ex-member of Parliament and Hon'ble Visitor of GKV, presided over the inaugural session of the seminar, an told that the Vedas and the ancient Sanskrit literature are good sources of information on medicinal plants and expressed need for further research in this field.

Speaking on the occasion Shri R C. Sharma, I.A.S. (Retd.) Hon'ble Vice-Chancellor of GKV, briefed the health problems being faced by the rural people, and urged the scientists who came from different Universities and research organisations, to take appropriate measures for the conservation of medicinal plants which is essential to meet the national target "Health for All". Hon'ble Vice-Chancellor expressed his faith that the seminar will go a long way to generate interest among the participants to pursue further research in this field.

Prof. S.C. Tyagi, Principal College of Science GKV, Dr. Vijay Shanker, Head of Botany Department, Dr. V. Arora, Registrar and Shri B.D. Bharadwaj, Finance Officer, were also present in the function besides the members of arts and science faculties of GKV.

Padmashri Dr. P.N. Mehra, Emeritus Professor, Botany Department, Panjab University Chandigarh, in his inaugural lecture on "Prospects of propagation and biosynthesis of active principles through tissue culture of threatened medicinal herbs" projected slides of his outstanding contributions and explained how the rare medicinal plants can be multiplied by culturing cell or tissue on a bit of medium in a test tube, to meet the present challenge of scarcity of medicinal plants.

Sponsored jointly by Council of Scientific and Industrial Research and the Indian Council of Agriculture Research, the seminar was attended by over 40 scientists from different universities and research organisations.

Dr. K. C. Verma, Principal of Govt. Ayurvedic College, Gurukula Kangri, who chaired up the 4th technical session entitled "Plants and Ayurveda" pointed out that GKV can play a useful role to provide leadership to pursue advanced research in this direction. Dr. V.P. Upadhyay exhibited the herbal cosmetics prepared by him. Some useful recommendations were made in plenary session.

'*Arya Bhatta*', *1986*
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National Symposium On Fish And Their Environment—A Report

Dr. Dinesh Bhatt
Department of Zoology, Gurukula Kangri Vishwavidyalaya, Hardwar

A national symposium on "Fish And Their Environment" was organised by Department of Zoology, Gurukula Kangri Vishwavidyalaya from 15-18 December 1986. The objectives of the symposium were to know :

1. The latest rate/areas/mechanism of fish resource depletion.
2. Extent and ways of damage caused by parasitic infections, a variety of other pathogens and myriad types of effluents and toxic substances; and their impact on various parameters like physiological, biochemical, histochemical, morphological, endocrinological and reproductive aspects of fishes.
3. Hydrobiological status of our aquatic systems at micro environmental level due to pollution and antipollution activities/measures.
4. Impact of present day environmental conditions on fish culture and to discuss various recent trends/means/ways of fish propagation

Honourable Minister for P.W.D. and Fisheries (U.P.), Sri Sita Ram Nishad inaugurated the symposium at 11 A.M. on 15th December, 1986. Dr. Joshi, Director of the Symposium introduced the Chief Guest Sri Sita Ram Nishad and requested the Vice-Chancellor of Gurukula Kangri Vishwavidyalaya, Sri R.C. Sharma, to preside over the function

In his address Hon'ble Minister expressed his deep cocern for depletion of the economically and ecologically important and endangered fish-fauna of our country due to over exploitation and pollution. The Minister was nopeful that this symposium. would provide scientists an excellent opportunity to come across a variety of such problems related to the theme of the symposium. In the end he congratulated Sri R. C. Sharma, Vice-Chancellor and Prof B D Joshi, Director of the Symposium for organising a national level symposium here, at Hardwar.

In his inaugural address Sri R C. Sharma, Vice-Chancellor reminded the scientists of the importance of hydrosphere that about 2/3 part of the earth is occupied by water and life originated in water. He further mentioned that unpolluted and a clean supply of water is not only important for the better survival of aquatic life including fish but also for human beings.

Prof. H R. Singh, Head of the Department of Zoology, Garhwal University, Srinagar, Garhwal delivered the Key Note address. He described various characteristics and ecological importance of fish and why fish conservation is needed.

Prof. Ram Prasad Vedalankar, Pro Vice Chancellor delivered welcome address, and Dr. Sengar, Director of the Archeological Museum said few words in the honour of the Hon'ble Minister.

In the end of the inaugural session Dr. Chopra, Reader in Zoology gave Vote of Thanks to the Chief Guest, all delegates, resource persons, funding agencies and other helping hands.

In all 121 delegates from all over the country participated in the symposium and about 91 persons presented their findings under 10 different sessions. The details of the sessions and invited speakers are given hereunder.

Session 1	*Inauguration*	
	Chief Guest :	Hon'ble Minister Sri Sita Ram Nishad
	President :	Sri R.C. Sharma, Vice-Chancellor

Session 2 : *Invited Lecturers*

Chairman : Prof. P. Natrajan
Department of Aquatic Biology & Fisheries, Agricultural University, Tuticorin.

Rapporteur : Dr. K. V. Sastry
Department of Bio-Sciences
M. D. University, Rohtak.

Speaker : Prof. P. D. Prasad Rao
Department of Zoology,
Nagpur University, Nagpur.

Topic : Some Sensory Pathways that conduct Environmental cues in Fish.

Session 3 : *Paper Reading*

Section : BIORHYTHMS AND PHOTOPERIODISM.

Chairman : Dr. S. V. Goswami
Department of Zoology,
Delhi University, Delhi.

Rapporteur : Dr. S. K. Kulshrestha
Department of Zoology,
M.V.M. Bhopal.

Session 4 : *Invited Lecturers*

Chairman : Prof. A. B. Das
Department of Zoology,
School of Life Sciences,
Visva Bharati University,
Santiniketan (West Bengal)

Rapporteur : Dr. R.B. Verma
Dy. Director
State Fisheries Department, U.P.

Speakers : (i) Prof. A.B. Das
Visva Bharati University.

Topic
Compensation of Protein Synthesis in the Tissues of *Channa punetatius* to changes in Environment Temperature.

(ii) Prof. H.R. Singh
Department of Zoology,
Garhwal University, Srinagar Garhwal.

Topic : Hill Stream Fish and Their Environment.

Session 5 : *Paper Reading*

Section : ENVIRONMENTAL PHYSIOLOGY AND BIOCHEMISTRY

Chairman : Prof. H.R. Singh
Garhwal University

Rapporteur . Dr. M. Ovais
Department of Bio-Sciences,
Bhopal University, Bhopal.

Session 6 & 7 : *Paper Reading*

Section : ENDOCRINOLOGY AND REPRODUCTIVE BIOLOGY/PHYSIOPATHOLOGY & PARASITOLOGY

Chairman : Prof. S.P. Gupta
Department of Zoology,
Lucknow University, Lucknow.

Rapporteur . Dr. P.C. Gupta
Department of Zoology,
D.A.V. College, Kanpur.

Session 8 · *Paper Reading*

Section · HYDROBIOLOGY
Chairman : Prof. Y.R. Malhotra
Department of Bio-sciences,
University of Jammu, Jammu

Rapporteur : Dr. C.S. Singh
Fisheries Research and Training
Centre, G B. Pant University of
Agriculture & Technology,
Pantnagar.

Session 9 & 10 : *Paper Reading*

Section : FISH CULTURE / HISTO-
CHEMISTRY, ANATOMY AND
TAXONOMY.

Chairman : Dr. Shakuntala Katre
Department of Zoology,
Bangalore University, Bangalore

Rapporteur : Dr. B.S. Malik
P.G. Department of Zoology,
Hindu College, Moradabad

Session 11 : *Valedictory Session*

Chief Guest . Dr. Satyaketu Vidyalankar
Chancellor,
G. K. Vishwavidyalaya.

President Sri R.C. Sharma
Vice-Chancellor,
G K. Visnwavidyalaya.

The valedictory session was held on the last day of the symposium, i e , on 18th December at 11 A.M. The Chief Guest Dr. Satyaketu Vidyalankar, Chancellor of this Vishwavidyalaya was introduced and welcomed by Pro Vice Chancellor Sri Ram Prasad Ji. A resolution of the symposium prepared by the senior professors of the different universities and the resource persons and which has been already passed unanimously by the whole house, was read in the Valedictory session. Following is the text of the resolution :

1. The symposium organised by the Department of Zoology of Gurukula Kangri University, Hardwar attracted a large number of experienced as well as young scientists in various fields associated with the theme of symposium. A total of 111 out station and 10 internal participants from 17 states and union territories of India actively participated in the symposium. A total number of 174 research papers

of very high standard were contributed, out of which 91 papers were read, spread over seven academic sessions, during a four-day period.

2. The deliberations were centred round the different aspects such as fish biology, physiology, ecoloy, endocrinology, fish production, pathology, toxicology, biorythms and parasitology, besides the histo-chemistry, anatomy and morphology. The symposium generated a lot of interest in the hydrobiology and fish biology of the river Ganges

3. In view of the placement of the Gurukula Kangri University in the close vicinity of river Ganga, the symposium recommends to the University to undertake fish studies at P.G. level, with special reference to hydrobiology, limnology and fish pathology for which there already exists all the basic infra-structural facilities in the Department.

In this connection it is the special responsibility of Gurukula Kangri Vishwavidyalaya to monitor pollution of the sacred river and arrange the culture of such fishes which are indicator of pollution, and help in the control of pollution. As the methodology of above culture-techniques needs to be standardized this symposium recommends that the University management is fully potent to make all the requisite facilities available to the Department of Zoology from the agencies like State Fisheries Department, I.C.A.R., etc.

4. In view of the fact that a lot of work in different Universities, Research Institutes and Colleges is being done in diverse areas associated with "Fish And Their Environment". It is felt that exchange and integration of ideas generated in fish-research is very essential from academic as well as applied socio-economic view point. In view to achieve this goal this academic congregation recommends that the continuity of the Symposium under the same title, i. e, "FISH AND THEIR ENVIRONMENT" be maintained in the form of periodic Symposium organised at different places. For this purpose UGC, CSIR, DOE, DST and ICAR may be approached for possible financial assistance.

5. From the papers presented during the period of this Symposium, it also became very clear that hazards of pollution are far more serious than so far realised or known on the Aquatic system in general and fishes in particular. The Symposium recommends that the Government

departments, Semi-Government agencies, Research Institutes and Universities should be given more responsibilities towards the improvement and developing such means as to improve the aquatic system.

6. The Symposium recommends that special attention be paid by fisheries department of different states for halting the depletion of fish resources in general and in hill areas in particular.

7. The Symposium feels gratified at the offers made by Prof. P. Natrajan, Head of the Department of Aquatic Biology & Fisheries, Kerala University, Trivendrum, for offering to host the next Symposium in November, 1983 at his place. This Symposium resolves to approach the UGC and other agencies to accept the proposal submitted for this purpose.

8. In order to monitor the aforesaid programme a steering committee has been formed as follow :

i) Prof. Y. R. Malhotra
Head, Department of Biosciences, Jammu University, Jammu.

ii) Prof. A. B. Das
Head, Department of Zoology, School of Life Sciences,
Visva Bharati University, Shantiniketan (W. Bengal)

iii) Prof. P. Natrajan
Head, Department of Aquatic Biology and Fisheries,
Kerala University, Trivandrum, Kerala

iv) Prof. H. R. Singh
Head, Department of Zoology, Garhwal University, Srinagar
Garhwal.

v) Prof. P. D. Prasad Rao
Head, Department of Zoology, Nagpur University, Nagpur.

vi) Prof. B. D. Joshi
Head, Department of Zoology, Gurukula Kangri Vishwavidyalaya,
Hardwar.

viii) Dr. S. V. Goswami
Department of Zoology, Delhi University, Delhi.

9. The pioneering and challenging task taken up boldly by Prof. B.D. Joshi in initiating the Symposium under the suspices of Gurukula Kangri Vishwavidyalaya is highly appreciated.

10. Finally the Symposium places on record its deep sense of gratitude to the Vice-Chancellor and management of Gurukula Kangri Vishwavidyalaya for hosting a Symposium of such a magnitude and for making the same a grand success.

Dr. Satyaketu Vidyalankar, Chancellor, appreciated very much the efforts of Prof. B. D Joshi and his colleagues in holding this symposium at Gurukula Kangri Vishwavidyalaya. He very emphatically expressed his desire that other undergraduate departments of Science faculty should soon start P. G. Courses and Ph. D. programme so that all departments could organise such symposiums of National importance from time to time. The Chancellor was very happy with the theme and objectives of the symposium specially because deliberations and discussions during symposium period were held on environmental conservation of aquatic life including fish species.

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One Year Of The Himalayan Eco-Development Project

Prof. B. D. Joshi
Principal Investigator; Head, Deptt. of Zoology,
Gurukula Kangri Vishwavidyalaya, Hardwar

The project entitled "INTEGRATED STUDY TOWARDS IMPROVEMENT OF EXISTING ECO-SYSTEM IN HIMALAYAN VALLEYS NEAR HARDWAR", was sanctioned to us in Feb 1985 The grant was received in the month of April 1985, following which initial process of planning and filling of the posts was started The appointments could be made by Sept. 1985, vehicle was received in Nov 1985 and then only the real field work could be started A formal inauguration of the project was done on 29th August 1985, alongwith a plantation programme in the Vishwavidyalaya campus.

Objective For The Period Under The Report :

This report is based on the preliminary works on our project which were undertaken during December, 1985 to August, 1986. Following were the target objectives for this tenure —

i) A thorough survey of the Kanva Valley area to determine the strategies of working, site of plantation, nursery, flood control measure construction, etc.

ii) To hold public meetings with village representatives at key places within the area of project work with a view of establishing contacts and rapport with local farmers/villagers to educate them about the importance of plantation of various tree species in their fields and houses.

iii) Establishing a nursery at Kanva Ashram and University campus for free distribution of saplings of various species to local villagers/farmers, and also for the purpose of mass plantation during our camps.

iv) To conduct socio-economic survey in the various study areas, viz, Kanva Valley and the Kangri village to know the state of economic, health, hygiene and ecological awareness and related problems in the region.

v) To organise a plantation camp involving local youth to strengthen and stabilize the banks of river Malini and also for soil conservation of the reclaimed land towards general Eco-Development.

A blue print regarding flood control measure, construction work is ready and actual construction work is likely to commence after the current monsoon.

WORK DONE

1. Mass Public Contacts :

A number of Public meetings were held at Kanva Ashram, the site of our work. The contacts were made at three levels :

i) Meeting with village leaders like Gram Pradhans, Block Pramukhs and other people who are barometers of public opinion and can mould public opinion. Several such meetings were held to gauge the needs of local people.

ii) Mass Public meetings involving hundreds of villagers. One such meeting was held during the Basant Panchami festival (Mela) in Feb. 1986, when thousands of people gather from adjacent villages like Mayakot, Motadhak, Kalal Ghati, Nimbuchod, Sigaddi, Durgapur, etc.

iii) Contacts at individual level, this was done by our project staff who have been permanently stationed there.

From all these meetings it has emerged that local villagers were interested in trees which are good for fodder, fuel and fruit purposes besides, are of high timber or / and commercial value. Interest in medicinal and aromatic plants has also been shown.

2. Establishment Of Nursery :

The nursery has been developed at Kanva Ashram measured 104 m in length, 42 and 15 m in breadth, at either ends. Seeds of the following species were sown after acquiring them from FRI and other seed supplying agencies.

	Local Name	**Botanical Name**
1.	Amla	*Emblica Officinalis*
2.	Sirus	*Albizzia Lebbeck*
3.	Kachnar	*Bauhinia variegata*
4.	Khair	*Acacia catechu*
5.	Bottlebrush	*Callistemon lanceolatus*
6.	Amaltas	*Cassia fistula*
7.	Shishan	*Dalbergia sissoo*
8.	Eucalyptus	*Eucalyptus sps.*
9.	Bhimal	*Grevia optiva*
10.	Subabul	*Leucaena leucocephala*
11.	Sahjan	*Moringa pterygosperma*
12.	Harsingar	*Nyctanthus arboristris*
13.	Goldmohor	*Poinciana regia*
14.	Amrud	*Psidium guava*
15.	Papita	*Carica Papaya*
16.	Kanju	*Caesalpinia bonducella*
17.	Arjun	*Terminolia arjuna*
18.	Harad	*T. Chebola*
19.	Bahera	*T. bellerica*

A nursery measuring 112 × 22 feet was prepared at the University campus. It was exclusively planted with poplar *(Populas indica)* clones. The nursery at Kanva Ashram yielded about 1,20,000 saplings, out of it about 50,000 saplings of *Eucalyptus* perished due to unfavourable circumstances. By the end of August about 10,000 saplings were distributed free of cost to the local farmers.

3. Socio-Economic Survey :

Work on this aspect was taken up in village Kangri located 8 Km. away from Hardwar on the Hardwar-Najibabad (Distt. Bijnor) road. This place has a great historical importance, as the original Gurukula

School was started by Swami Shraddhanand 86 years ago at this very place. In the Kanva Valley village, survey has also been conducted and the data are under process.

The objective of conducting a socio-economic survey at Kangri village was to obtain information on the state of health, economy, education, environmental awareness and consciousness of social and economic problems faced by the rural communities. It is proposed that within the frame work of the project, works like plantation, making available saplings etc. would be taken up to help the villagers. Besides, this information could serve as a strong indicator for any further planning and implementation. Salient findings of survey are dealt below.

Kangri village has about 140 families with a population of 900. The location is on the river bank and the village is extremely backward. The family size is 6-10 in 50% of the families and 3-5 in about 47% of the families. 54% of the people are in 18-60 years age group, 42% are less than 18 years of age.

Illiteracy was about 100% in ladies. The overall illiteracy was 58%, with the male, female break up being 48% and 92% respectively. It was 40% and 60% in case of boys and girls. 28% had basic education (upto 5th class), 10% upto 10th class and there were 10 graduates (2%), and only 3 Post Graduates which is 0.67% of the population.

Monthly income ranged between Rs. 1-300 in 85% cases covering 53% families and Rs. 301–1000 in 39% families. Only 11 individuals earned over Rs. 1000/– covering 6% of the families. The average per head income per month Rs. 86/- and the average family income is Rs. 452/- per month. 22 families were beneficiaries of self employment schemes, the average loan given to them being Rs. 2.565 Their income rose from Rs 125 to Rs. 288/- per month, after obtaining these loans.

It was found that the state of health and hygiene among the villagers was very poor. The birth rate was 6 per couple in the first generation and 4 in the second (present) generation. Indicating low but improved family planning awareness.

Majority of the people were working on daily wages as labourers. Sewing, carpentary, milk vendoring and running bullock carts are the chief occupations. Only 85 adults were employed, 18% in farming and self employment and only 8% held permanent jobs.

The villagers were not particulary aware of ecological problems and they were not at all interested in Shramdan but can work only as daily wage labourers, due to their extremely poor condition. In order to improve their status, self employment schemes like fish, sheep, goat, poultry rearing would be ideal. Since the adjoining hills are rich reservoirs of various medicinal and aromatic plants, starting of an Ayurvedic Pharmacy would improve their job prospects and economic conditions.

4. Plantation Camp :

A Plantation Camp was conducted from Aug. 1, 1986 to Aug. 12, 1986 at Indira Priyadarshini Intermediate College Motadhak, 8 Km. from Kotdwar. The site of plantation was on the bank of river Malini. Seasonal floods and erosion have severally affected thetopography of the area destroying large area of forest and removing top soil, rendering vast lands unfit for cultivation.

The camp was conducted involving 100 students of the college. On Aug. 3, 1986 the camp was formally inaugurated by Shri Brahm Dutt, Union State Minister for Commerce. Saplings were planted in pits of 1 cft size. About 16000 saplings were planted during the camp. The saplings were supplied by forest and irrigation deptts. besides our nursery. The closing function of the camp took place on 13.8.86. D.F.O. Kotdwar range, Shri Madan Mohan Tiwari Ji was the Chief Guest and Shri Chandra Singh Rawat, Ex-Block Pramukh and veteran freedom fighter presided over the function.

Analysis And Findings

Since this is an action oriented project, the concentration of work so far has been on field oriented problems. Inference are not related to any lab oriented research but regarding refinement of some techniques and approaches used in field work.

1. The villagers/farmers basically treat forests as resources for use and as a matter of their right and accept no responsibility for their indiscriminate use. They generally prefer to plant eucalyptus species because of its direct and immediate monetary returns. They feel that it is basically for the Government to plant trees and protect them. All

this indicates that more environmental knowledge is to be imparted involving masses more and more Without which success of such effects would be limited.

2. The villagers were quite keen in accepting the saplings free of cost but their choice is limited mainly to Eucalyptus, Shisham and fruit species, besides few local fodder trees.

3. The Socio-Economic survey at Kangri Village reveals that success of an environmental programme has a direct bearing on the socio-economic level of the villagers. Villagers are unlikely to participate in any "Shram Dan" movement, as they are very poor. Similarly they may not contribute properly to any environmental protection programme if not educated to a certain level.

4. Success of the camp can be measured only in terms of saplings which survive. For this, proper fencing and watchmen are essential. Without these two precautions it is not worth conducting a camp involving public funds, which so far has not been provided at any level. The planted area should be protected either by the State Forest Deptts or by Village Panchayats otherwise the good and pious intentions of such programmes would go waste.

5 As regards the problem of flood control is concerned, from the exhaustive survey of the whole Bhabar belt, it has been inferred that besides the thinning of forests in the catchment areas of these rivers and their feeder rivulates, and denuding of the river/rivulet banks, the sand, pebble and boulder lifting by Govt., Semi Govt., and private contractors are equally causative of the severe floods, recurring annually. So, this must be banned forthwith

Work Planned For Future :

Besides continuing with the work going on as outlined above, during the current year, work related to research and construction would be undertaken.

A) Land use planning & Eucalyptisation impact studies :

A soil survey would be conducted with the help of aerial photographs as well as field checking for land use planning as per land capability classification. Secondly, a study would be undertaken to evaluate the impact of *Eucalyptus* monoculture on soil properties as compared to mixed forest, bareland and cultivated lands. Thirdly, a free soil test cum recommendation service could be proposed to the local farmers for their betterment.

B) Engineering Works :

From a number of public meetings with the villagers, it has emerged that the menace of river Malini, particularly in the rainy season has caused immense damage to crops and soil loss besides, land degradation. Regular lifting of sand, gravel, boulders through the length and width of the river, has intensified this damage, to rectify this situation, dredging the river to channelise its course could be undertaken. Besides bunds, spures, cement blocks would be constructed to check floods and soil erosion.

C) Work on Insects

Survey of major insect pests of the important crops and trees is to be made.

D. O En. must also give full liberty to the Principal Investigator to make necessary changes in the project execution. Besides, the college, institutes or the University where such projects are being run must make it convenient that P. Is. have sufficient time at their liberty to properly concentrate on these project work, their progress and success. This is indeed very much required in a multidisciplinary project of this nature and magnitude, it may be very difficult for the Principal Investigator to foresee all miscellaneous needs and problems at the conception stage.

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Integrated Study Of Ganga

(Govt. Of India, Department Of Environment)
Gurukula Kangri University Hardwar

Dr. V. Shanker
Professor & Head of Botany Deptt.
Principal Investigator

SUMMARY & RECOMMENDATIONS
(OCTOBER, 1986)

Summary :

A critical and extensive survey of the Ganga and its basin from Rishikesh to Garhmukteshwar started in Feb–1984.

As a result of the study and of the interaction with the people and the officials (Municipalities, Public Health Departments etc.) four reports on the state of environment were prepared in may-June 1984 and published in the initial stages of the project. Some of the reports were given on request to IDPL Rishikesh, U. P Jal Nigam Engineer (at Roorkee) and others and were also sent to various concerned deptts. A series of three articles on Ganga Pollution published in Hindustan Times (Sept. 9,11,12, 1984) by H. T. correspondent, after interviewing Dr. Shanker, focussed on various points made by the latter in respect of pollution and the remedial measures. These generated a nation-wide interest and understanding in respect of Ganga Pollution. The Govt. also felt concerned in the matter. Soon after the Central Ganga Authority was established in early 1985 by Prime Minister Rajiv Gandhi. The formation of the CGA gave direction and speed to action programmes and soon Jal Nigam, Pollution Control Board, Municipalities and forest departments came into action along with the Gurukula Kangri University in Rishikesh–Hardwar region.

Officers of Bijnor district and the people living in a chain of villages along Ganga were also activated to take measures for checking soil erosion and for protecting villages from the floods. A number of meetings with people and officers were held.

The results of the study are summarised below

(i) The major culprits of polluting Ganga in the upstream were Saraswati Nala, IDPL Nala, BHEL-Jwalapur Nala and a number of storm water and domestic waste water channels evacuating into the Ganga. The Nalas and the Ganga water at Nala outfalls showed low DO and high BOD, COD, MPN index and SPC. In the downstream, the cremation ground at Nagal & Garhmukteshwar, the Magad Nala and the distributive pollution were responsible for increase in BOD, COD, MPN index SPC values. Vam organics Gajroula and a few others were also responsible for pollution. The construction of barrages at Rishikesh and Bijnor (Pashulok barrage, Rawali barrage) have resulted in ecological disturbance leading to seepage, floods, water logging, This obviously has rendered a large area of land unfit for cultivation, in loss of lives and in economic losses,

(ii) Certain algal genera *(Nitzschia, Closterium, Navicula, Microcystis, Arthrospora, synedra* etc.) that occurred almost regularly in polluted waters could be taken as indicators of pollution in the stretch of Ganga under reference. Similarly a number of genera frequented nonpoluted water e. g. *cladophera cymbella, Terbiliaria, Oedogonium.* The study agreed with Palmer (1969) that less diverse the algal population the greater was the possibility that the sample was taken from polluted area. Thus only 6 genera were recorded from BHEL-Jwalapur Nala (polluted) According to Palmer a small list of algae at generic level may be more useful in identification of polluted and non polluted waters.

(iii) Among the higher plants that were growing along effluent channels, *Achyranthus aspera, Armaranthus spinosus, A. racmosus, Withamia somnifera, Croton, Cynodon dactylon, cypeeus rotundus, Eclipta alba Xanthium, Bidens, Lippia, Ranunculus* were some of the more common species encountered. Many of them were common on and near the city garbage.

(iv) Lalta Rao Nala, BHEL-Jwalapur Nala and Braham Kund showed the presence of lead and cobolt and in the last case arsenic also in small quantity. Cadmium was not found

(v) Effect of mass bathing at Har Ki Pauri on Kumbh and other festivals indicated small increase in *turbidity, conductivity, hardness, COD* and *chlorides.*

(vi) The Bhimgoda tank water was stagnant and pulluted and needed proper attention. Turbidity, BOD & COD showed high values.

(vii) Soil erosion was ramport in a very large area extending from *Rishikesh* to *Bijnor*. An estimate of the loss was made and the measures for checking the loss have been suggested which include *planting correct plant species* in correct places, *ban on stones lifting from river bed, construction of check dams.*

(viii) Plant collectors & pharmacies reported that earlier Medicinal plants were available/collected in large amount from the area (Rishikesh-Hardwar & Chandi range). The quantum of collection has decreased over the years due to over exploitation and ecological degradation. In some cases this has led to their getting very rare to locally extinct (Leea aspera, Uraria picta).

—There is immediate need for their conservation and enrichment. A list of medicinal plants recommended for Ganga-Shivalik has been given by ISCG to Range Officer BHEL for growing in their nursery and for plantation next year on Shivalik and adjoining area.

It has been reported that population of wild animals Cheetal, Siar, Barahsingna, Hiran etc) in the forest (Lachiwala, Raiwala) decreased after 1947 due reportedly to easy permission given for hunting and to activities of Gujars. As a result the coming up of *Sal trees* in the forest was hampered as the seeds remained lying on the surface of the fallen leaves undisturbed by animal activity and thus did not reach the soil Their viability period being low, a large number of them were wasted. Previous to 1947 the action of the hoofs of animals opened up the soil beneath the leaves and worked up the soil making it suitable for germination if a seed happened to fall on it.

(ix) A large land area along *Chilla Canal, Swami Ram's Ashram, Upper Ganga Canal, Nagal, Bijnor, Balawali,* suffered from seepage, water logging and in the latter cases floods also. As a result a number of trees in Chilla forest along canal have died.

(x) The Sturdia Chemicals Rishikesh seems to have adversely effected the natural flora of the vicinity. Studies are in progress.

(xi) In general the main crops grown in the area were wheat, paddy, sugarcane, potato, tobacco. Gram is generally not grown.

(xii) The characters of sewage water used for irrigation of farm of Misarpur revealed high BOD, COD, MPN & SPC and low DO. The crops successfully grown in the farm were potato, cauliflower, tobacco, maize, wheat etc. The crop yield in sewage farm was estimated to be double that of canal irrigated farm. The sewage farm had another advantage. The new crop could be sown just after 24 hrs the old crop has been harvested. The maintenance of sewer line leading to farm however was not satisfactory; it was not cleaned and the city garbage was being dumped into it resulting in its blockade and backward movement of sewage and leakage through main holes in the city. *Size of sewer line has to be increased.*

xiii) Tree plantation on river bank on a small scale was attempted. Plants were raised in project nursery.

xiv) The high values of BOD, COD, MPN index during monsoon could be ascribed to siltation and distributive pollution.

xv) Environmental awareness Programmes such as exhibition (Har-ki-Pauri) *tree plantation,* seminars were organised. Popular articles, poems, were published. A. I. R. and newspaper interviews also helped in increasing environmental awareness.

xvi) Central Ganga Authority :

The Central Ganga Authority deserves praise for the steps taken for the cleaning the Ganga in Rishikesh-Hardwar region. A comparison of the 1985 and 1986 data shows that there has been a significant decrease in BOD and COD values and an increase in DO values. MPN at Muni-ki-Reti and Har-ki-Pauri was found to be low and sometimes nill after the operation clean Ganga by CGA. It is hoped that this picture is not only maintained but is improved.

RECOMMENDATIONS :

1. A regular watch on the river quality is necessary

2. Industrial and domestic wastes should also be monitored to assess the pollution influx.

3 Action oriented programmes such as plantation, introduction of alternative sources of energy and bio-fertilizers in rural areas should be initiated without losing time.

4. Municipalities and industries in the region under reference should have a working sewer system and well monitored sewage farm, oxidation stabilization pond or suitable treatment plants for the treatment of their wastes. Optimum production of fuel gas and fertilizers from the plant should be achieved. The effluents flowing out of the plant after treatment may be stored in a tank/ pond of appropriate size and suitable plant species grown therein for *evapo-transpiration*, *biomass production* for use as *biofertilizers* and for *bio-gas production.*

   Municipalities should also realize that municipal water quality control starts with the management of the river basin to protect the raw water supply and therefore should give due attention in this regard,

5. In order to check soil erosion, river banks and hills should have a thick plant cover consisting of suitable plant species, herbs shrubs and trees. As far as possible, selection of multipurpose species which not only provide fuel and check soil erosion but, can provide a number of additional benefits in the form of *fruits, oil, seeds, edible leaves, honey, forage* for livestock and silkworms, *medicinal products, pesticides, detergents, gums, dyes* etc. shall go a long way in creating a pleasant, beautiful and stable surroundings and in reducing pollution and erosion and in improving the soil and wealth of the river basin.

   A programme of plantation of degraded land should also be taken up.

6 Concentrated effort for introducing solar energy and biogas both in rural and urban areas seem to be an essential step for the amelioration of the environment.

7. Construction of electric crematorium at places where a large number of bodies are cremated such as at Garhmukteshwar, Hardwar.

8. Environmental education programmes should be stepped up

9 For sewage disposal we may go in for *Biological treatment plant, Oxidation stabilization pond or sewage farm.* Their economics and workability should be studied in depth. In a country where sewage pumping stations remain idle and/or do not work for prescribed time, BTPs constructed are not even commissioned or remain out of use, sewage line and gully pits remain blocked; sewage farm, where feasible, may be the first choice.

10. Dredging of the river where silt deposition is high.

11. Stone-lifting from river should be banned or restricted so that the villages do not suffer.

12. B,H.E L Ranipur, Doon Distillary Kuwanwala, Vam Organics should have a suitable treatment plant for treatment of their effluents. I.D P.L. Rishikesh may be asked to improve the working of their treatment plant and also to study the possibility of growing *Azolla* and *Eichornia* on the effluents for bio-fertilizer production and bio-mass energy. The detrimental affect of Sturdia Chemicals on flora needs further study.

13. There is urgent need to conserve the medicinal plant wealth of the region. More important medicinal plants may be taken on priority basis for growing on hills, river banks, road-sides. Where-ever advisable mixed population of plants yielding drugs, timber, pesticides, detergents, oils, energy and those effective in checking soil erosion and in increasing soil fertility has to be grown in suitable places—hills, river banks, road sides, farms and degraded lands. This requires a well planned strategy in which the local population should actively participate. Model plantation frame should be first established in selected places so that these could be seen, their benefits, methodology and economics is under-

stood by people for acceptance and extension of the programme. Industrialists, Ashrams, Akharas, Institutions and voluntary agencies may be persuaded to adopt certain areas for this purpose. The role of government departments is obvious. Their cooperation is essential Required literature spelling out the details of the whole exercise to be performed, its economics, protection of plantation, their maintenance, etc. should be available to those who take the job.

14. The extent of sedimentation in river Ganga is well known and the only way it can be reduced is through tree plantation. Plantation of suitable plants and their after-care is not as simple as it appears. An apex body like Central Ganga Authority may plan and supervise this exercise and some universities may be actively involved in this task.

15. There should be separate storm water and municipal waste water channels in Hardwar and Rishikesh.

Acknowledgement

Grateful thanks are recorded to Govt. of India, Deptt of Environment for financial assistance and to Vice Chancellor, Gurukula Kangri Vishwavidyalaya for providing facilities for work.

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Adult Education Programme On The Path Of Progress

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National Adult Education Programme which is being funded by University Grants Commission is being implemented by this department in rural as well as urban areas of this region through its sixty adult education centres under the guidance of Shri R.C. Sharma, I.A.S. (Retd.), the present Vice Chancellor of this University.

About twenty five villages have been covered under this programme so far. Special emphasis is being given to open the new centres in Harijan localities, backward areas and in the areas where minorities reside. There are separate centres for males and females. Ofcourse, a few co-educational centres are also being organised These centres are being organised by a team of devoted instructors comprising of teachers, students, social workers, extension workers and housewives.

To assist the Assistant Director and Head of the Programme there is one Project Officer and two Supervisors. The establishment work is performed by the members of University staff. This department possesses a colour T.V. and V.C.R. for publicity and extension works.

There is one Advisory Committee to advise this department with Vice-Chancellor as its Chairman and Assistant Director as its Member

Secretary along with a team of learned persons. The last meeting of this committee was held on 3.10.1986. Besides others it was also attended by Shri J.D. Sharma, I.A.S. (Rtd), a former Vice-Chancellor of Punjab University as representative of U. G. C. He expressed his satisfaction over the functioning of this programme. He also gave some valuable suggestions which are being practised.

Besides regular programmes some special programmes were also launched by this department in the month of October, November and December, 1986. The highlights of these programmes can be summarised as follows :

1. Mass Literacy Programme

This programme was launched in village Missarpur from 20-10-1986 through the students of this University on the basis of a social survey conducted by them about the percentage of literacy there which was found to be fifty percent by opening fifteen adult education centres in Harijan Bastis and other needy areas and by distributing learning materials to the learners.

2. Distribution of Literacy Kits

By special efforts this department secured 300 Literacy Kits worth Rs. 6000-00 free of cost from Literacy House Lucknow in October 1986. These kits are being given to the students of N. S. S through Dr. A. K. Chopra, Programme Officer N. S. S., under Each-One Teach-One programme with the object that each student will teach atleast one illeterate person.

3. Publicity Programmes

With the objective of making the masses aware of N. A. E P. and other programmes of national importance various publicity programmes were conducted by this department with the cooperation of the Field Publicity Officer, Ministry of Information and Broadcasting, Government of India, Dehra Dun in Missarpur, Ajeetpur, Bahadurpurjat, Kangri and Harinagar from 10-11-1986 to 14-11-1986. During these days films on Adult Education, 20 Point Programme, National Integration, Family Welfare and on other such subjects were shown to the masses. Charts and Poster exhibitions covering various development schemes were also organised. The pamphlets were also distributed among audience. The meetings were organised and addressed by Assistant Director and Field Publicity Officer.

4. Each-One, Reach-One, Teach-One Programme

This department paid its homage to Late Swami Shradhanand Ji, the great martyre by launching this programme in village Kangri from 23rd December, 1986, the day of his martyrdom through the students of N.S.S. A literary kit was provided to every participant of N.S.S to undertake the work of educating one illeterate person during their stay there, followed by the regular adult education functionaries.

On this occasion the plantation programme was also performed in this village for which 500 saplings comprising of Eucalyptus, Guava, Mulberry, Black Plum, Neem, etc. were obtained by this department in collaboration of N.S S. department from the Forest Department Bijnor free of cost under Social Forestry Scheme.

The Assistant Director and the Project Officer of this department have represented this University in the Seminars on Legal Literacy and Population Education held in Simla and New Delhi respectively in September, 1986.

With the objective of extending its activities the department has sent proposals for the sanction of 60 more adult education centres. A project on population education and continuing education have also been submitted. The proposal of Legal Aid Clinic was also submitted to CILAA

The department is getting full cooperation from the administrative as well as teaching staff of the University It is hoped that this department will rise further and further under the patronage of present Vice Chancellor

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Kangri Towards Development

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Kangri, a village of about 1000 population is situated on the bank of river Ganga in District Bijnor. Its population constitutes Brahmins, Kashyap, Pal Kshatriya and Harijans, etc. Their main occupation is agriculture and labour.

This village is of historical importance. Late Swami Shradhanand Ji established the old 'Gurukula', a world famous unique institution in this village which was later on shifted due to natural calamities to the place where it is present as Gurukula Kangri Vishwavidyalaya these days.

Being the birth place of Gurukula, this University has natural affection with this village and is interested in its overall development. Several efforts have been made for its development in the past. Prof. G.B.K. Hooja, a former Vice Chancellor of this University showed special interest in its development and because of his special efforts, a community centre has been constructed, a library has been established and the village has been linked with the main road by Kharanja besides other development works.

Sri R.C. Sharma, the present Vice Chancellor of this University has also shown keen interest in the development of this village and he wishes to see this village as an ideal one. For this he has constituted a three-member committee with Prof. Vijay Shanker, Head of Botany Department as its Chairman and Dr. Anil Kumar, Assistant Director Adult Education and Dr. A.K. Chopra, Reader Zoology Department and Programme Officer N.S.S. as its members.

The department of Adult, Continuing Education and Extension Programme has been entrusted special responsibilities to look after the development works there. This department has already submitted a list of development works which are required to be done and which includes :

1. The protection of the village from the streams of river Ganga.

2. Electrification of the village.

3. To provide irrigation and drinking water facilities.

4. Establishment of Primary Health Centre.

5. Construction of Panchayat Ghar.

6. Protection of villagers and their property from wild animals.

7. Strengthening of Primary Pathshalas.

8. To grant loans for the establishment of cottage industries based on Bhabar.

9. To eradicate illeteracy.

10. Plantation under Social Forestry Scheme.

11. Conservation of Soil, etc.

The present Vice Chancellor has sent this list to the District Magistrate and District Development Officer Bijnor along with his request to take special interest in the development of this village and these authorities have responded positively

Three adult education centres are being organised in this village by this department to eradicate illeteracy. A plantation programme was also performed in this village on 23-12-86, the day of martyrdom of late Swami Shradhanand Ji.

'Integrated Study of Ganga' is also conducting a socio-economic survey of the villages lying along the Ganga and has already prepared a report in respect of the threat to the villages from Ganga. Remedial measures have been suggested by project team headed by Prof. Vijay Shanker.

It is believed that this village will become an ideal village of this region in coming years.

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NSS Camp At Kangri Village

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A ten-day Annual NSS Camp of the students of Gurukula Kangri Vishwavidyalaya was organised from December 22 to December 31, 1986 at 'Punya Bhumi' of Kangri village. The inaugural function of the camp was held at Kangri village on December 23, 1986. Shrimati Sharma (wife of Shri R C Sharma, Vice-Chancellor, G.K.V.) was the Chief Guest. The function was presided over by Shrimati Satyaketu Vidyalankar (wife of Shri Satyaketu Vidyalankar, Chancellor of this Vishwavidyalaya). Prof. O P. Mishra (NSS Coordinator) welcomed the Chief Guest. Shrimati Sharma, in her inaugural address, exhorted the women of the village to take active part in the development of Kangri village and also to cooperate with the students in implementing their Village Development Programme. Shri R. C. Sharma, various officials and teachers of the Vishwavidyalaya were also present on this occasion. Shrimati Sharma distributed literacy kits to the NSS students under the Adult Education Programme. The function was concluded with the plantation of saplings by Shri and Shrimati Sharma and others in the Vidyalaya premises and in the nearby houses.

During the period of the camp, the following works were done in the village by the students .

1. Five hundred saplings were planted in the premises of various houses. Of these, majority was that of fruit-giving trees.
2. Thirty persons were taught by the students in the evening hours with the help of literacy kits under the Adult Education Programme. Besides this, students of the Vidyalaya were given help in studying during the day-time.

3. The river-bed, linking the village to Punya Bhumi was cleared

4. The 'Khadanja' linking the village to the main road was repaired.

5. Seventy four kitchen soak-pits were dug so that no unnecessary water could accumulate here and there in the lanes. Besides this, two big pits were dug near both the wells to avoid unnecessary water in the nearby area.

6. The villagers were made acquainted with the special agricultural techniques The students helped villagers in manuring their fields.

7. The village wells were purified by adding Potassium Permagnate.

8. The villagers were made acquainted with personal hygiene, immunization, family planning, etc

9. The stool examination of various villagers were done to detect the type of infection, if any.

10. A survey was made to collect the data regarding the population, percentage literacy among the villagers and the type of disease, if any.

The closing function of the camp took place at 'Punya Bhumi' on December 30, 1986. Prof. S. C Tyagi (Principal, Science College, G.K.V.) was the Chief Guest and Prof. Mishra presided over the function Prof Tyagi encouraged the students to devote their sincere services towards such programmes. The function was concluded by various cultural items performed by the students

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Justice C P. Agrawal (Retd Judge of Allahabad High Court) arriving to deliver a talk on the 'Importance of International Court of Justice'. (L. to R)—Sri R. C Sharma, Vice Chancellor, Justice C. P. Agrawal, Sri Virendra Arora, Registrar, Sri Ramprasad Vedalankar, Pro-Vice Chancellor, Prof. R.L. Varshney, Prof. S C. Tyagi.

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'Importance of International Court of Justice'

(Abstract of speech delivered by Justice C.P. Agrawal Retd. Judge of Allahabad High Court)

Justice Chandra Prakash Agrawal (Retd. Judge of Allahabad High Court) delivered a talk on the 'Importance of International Court of Justice'. He said that the concept of the international justice without the law enforcing machinery was a myth. For any kind of justice, moral values and ethical environment is necessary. He also said that in India, international law has never been violated. Much of the international law can be effected by the strong will of the political leaders who should decide what kind of order they want. Much shall depend upon the spirit of federation of the whole world.

Thanks giving ceremony was completed by Sri R.C Sharma, Vice Chancellor, Gurukula Kangri Vishwavidyalaya and Sri Virendra Arora, Registrar The talk was organized by Dr. R L. Varshney, Professor & Head of English Department.

The talk was followed by a scintillating Question-Answer session.

Sri R. C. Sharma, Vice Chancellor, Gurukula Kangri Vishwavidyalaya and Sri Sita Ram Nishad, Minister for P.W.D. & Fisheries (Govt. of U.P.) on way to attend the Inaugural Function of the 'National Symposium On Fish & Their Environment', accompanied by (L. to R.) Sri Ramprasad Vedalankar, Pro-Vice Chancellor, Sri Virendra Arora, Registrar, Dr. B.D. Joshi, and Dr. D. Bhatt.